PC MAGAZINE

RSONAL COMPUTING MARCH 15, 1994 VOLUME 13 NUMBER 5 $2.95

EDITORIAL LIBRARY

Monitors, Monitors, Monitors

Take Your Pick From 54 Pretty and Affordable Displays

Start Your Tax Prep Here: We Review Ten Packages

Plug and Play: A Panacea for All Our Hardware Woes?

MAKING ON-LINE SERVICES WORK for YOU

PRODIGY

AMERICA ONLINE

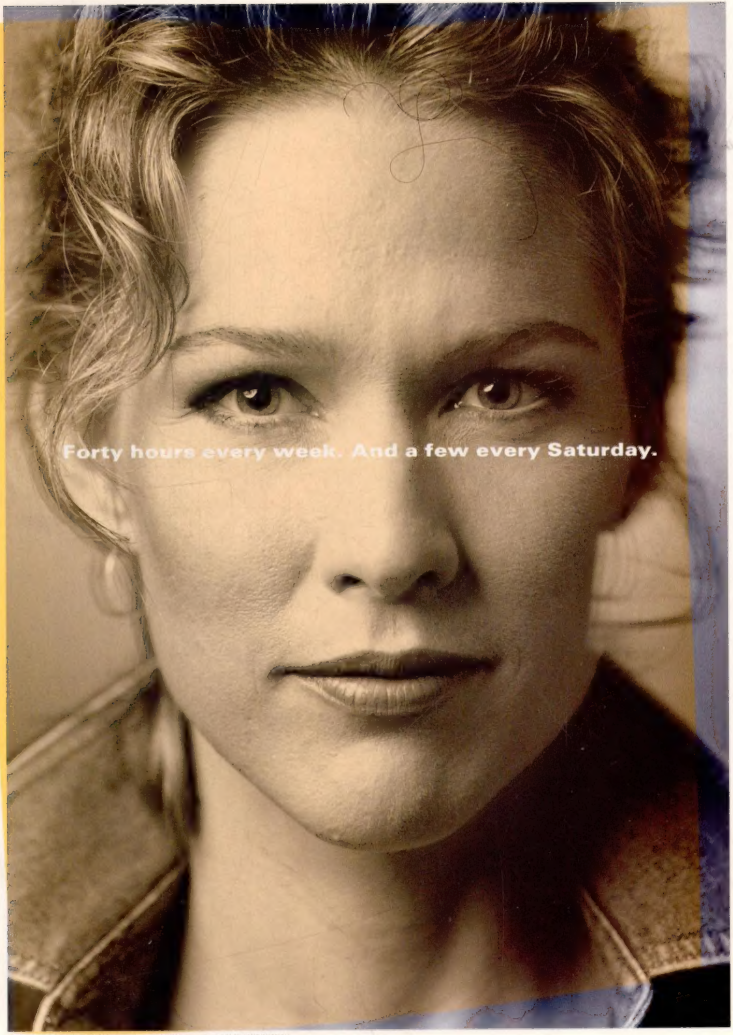
COMPUSERVE

GENIE

DOW JONES

EXPLORING the INTERNET

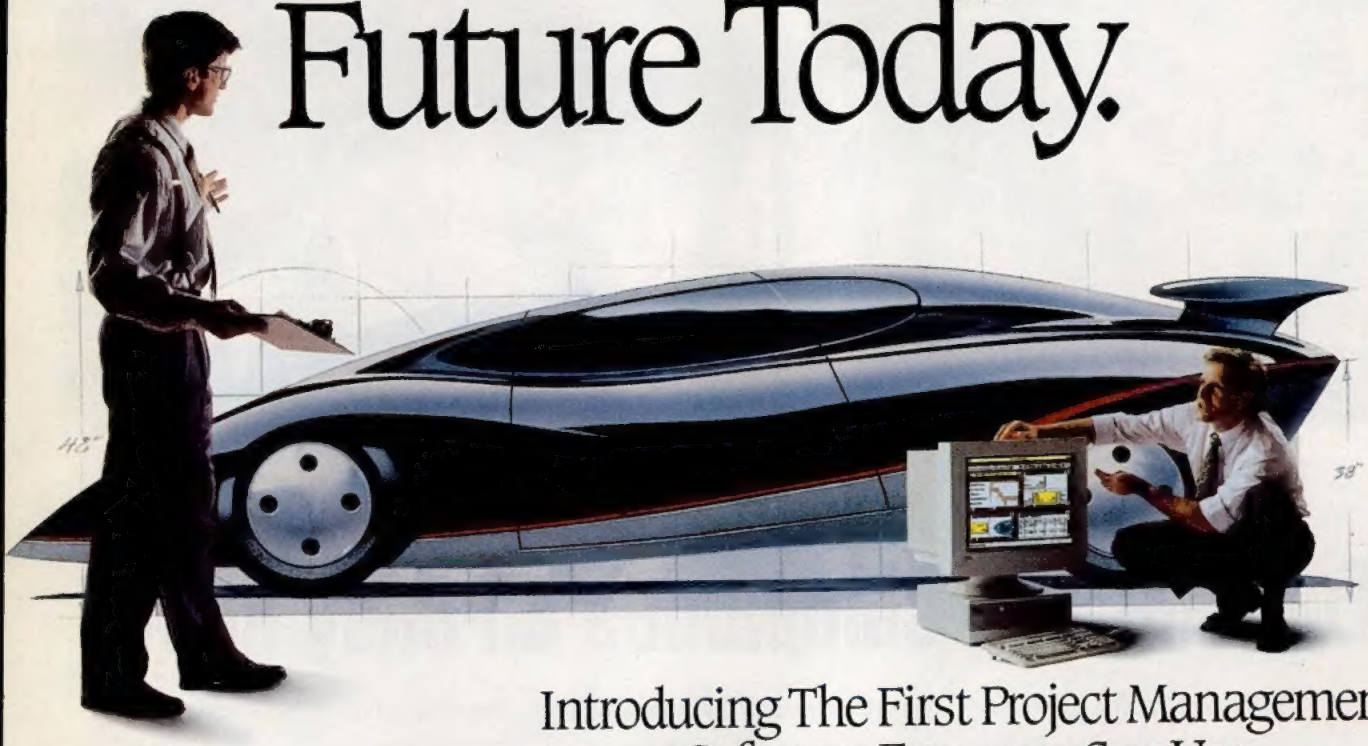
0140246 9 11 02591



MultiSync is a registered trademark of NEC Technologies, Inc. © 1993 NEC Technologies, Inc. NEC 0244#2000K91A035241

Switch To CA-SuperProject For $149 And Get TimeSheet Professional® For Free.
For A Limited Time. Save More Than $600.

How To Manage The Future Today.



Introducing The First Project Management Software Everyone Can Use.

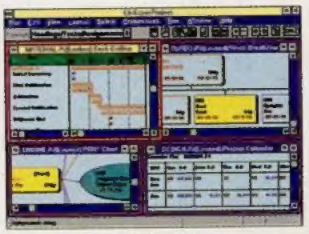
Beginners Love It Because It's So Easy.

Only CA-SuperProject™ offers a special Beginner Configuration with simple, easy-to-understand menus and an on-line "PM Assistant" that walks you through procedures and teaches the basics of project management. Lots of sample data and excellent tutorials make it fun to learn and super easy to use.

1993 W 100 WINDOWS MAGAZINE ANNUAL WIN AWARD

Experts Love It Because It's So Powerful.

CA-SuperProject has all the flexibility and power you need to manage extensive projects without any constraints. It's more sophisticated, more effective and, according to NSTL *(Software Digest)*, it's the "best program for users who require a very powerful project manager with the most complete tools for modeling and managing resources, analytic functions and the most efficient resource leveling available."*



MICROSOFT WINDOWS COMPATIBLE

Buy one version, get the other FREE.

To Order, See Your Local Dealer Or Call 1-800-225-5224, Dept. 62007

Call now to find out how you can manage your projects efficiently. CA-SuperProject and TimeSheet Professional from TIMESLIPS Corporation – the best way to manage your future today.

COMPUTER ASSOCIATES
Software superior by design.

CIRCLE 193 ON READER SERVICE CARD

New CA-SuperProject 3.0

*Software Digest, Vol. 10, No. 4, 1993. Software Digest is a registered trademark of NSTL, Inc., a McGraw-Hill Co. Dealer prices may vary.

© Computer Associates International, Inc., Islandia, NY 11788-7000. All product names referenced herein are trademarks of their respective companies.

THE LEADER IN OBJECT COMPUTING

Discover the database 9 out of 10 Fortune 500 companies already know

New version 4.5

Paradox® is the #1-selling database because it's the easiest way to access, manage, and present your information. Its unique object-oriented technology makes Paradox the only database with the future built in!

SQL ready

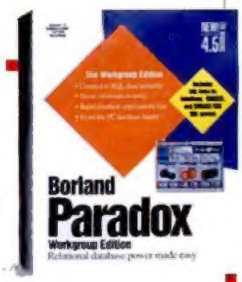
Instant plug-in connectivity to popular SQL servers like Borland InterBase,™ Sybase/MS,® and Oracle make it easy to "upsize" applications to secure client/server applications. And Paradox is the only database with a Workgroup Desktop, so you can send tables, query results, or even complete applications to anyone, anytime, anywhere in the world. Paradox is the best choice for a corporate standard, because nothing else combines such flexibility, speed, and ease-of-use to make users at all skill levels instantly more productive.

Information at your command

Only Paradox for Windows provides seamless access to all the most popular database formats—Paradox for DOS and Windows, dBASE,® and now, FoxPro. You can use all the data available, even on a network, combining DOS and Windows users. And with graphical Query By Example, it's quick and easy to get just the information you want.

If you want a relational PC database that's easy to use, fast, powerful, and gives you complete connectivity, the choice is easy. No wonder Paradox 4.5 for Windows Workgroup Edition is the standard that's lighting up corporations worldwide.

$149.95
Special Upgrade Price*



90-day, money-back guarantee!
See your dealer or call now, 1-800-336-6464, ext. 8093
In Canada call, 1-800-461-3327.

Borland
Power made easy™

*All Access, FoxPro, Superbase, and Approach owners qualify. $20 additional rebate for Paradox and dBASE owners. Copyright © 1993 Borland International, Inc. All rights reserved. All Borland product names are trademanks of Borland International, Inc. Prices good in the United States and Canada only. All prices are in U.S. dollars. Dealer prices may vary. BI 6233

CIRCLE 285 ON READER SERVICE CARD

PC MAGAZINE March 15, 1994 Volume 13 Number 5

UP FRONT

Inside
The business of on-line 4

Letters
Benchmark tests revisited..19

Trends
- Infrared: the wireless wanna-be
- Tuning in to cable PCs
- Notebooks brighten up
- Pictures worth a thousand queries.....29

First Looks
- New notebooks from NEC, TI, and Toshiba
- Handwriter for Windows
- Laplink Wireless.....37

New & Improved
BY ANUSH YEGYAZARIAN.....61

Read Only
EDITED BY LANCE ULANOFF....73

COLUMNISTS

Michael J. Miller
Software Patents Must Go ..79

Bill Machrone
Dead Architecture Lives Again.....87

John C. Dvorak
Of Tail Fins and Notebooks 93
Inside Track 95

Jim Seymour
Everything Old Is New Again.....99

Bill Howard
Erasing Windows Pains....100

COVER STORY

On-Line Services

Making On-Line Services Work For You

BY ANDREW KANTOR

The on-line world has exploded. Better services and new front ends make it easier—and less expensive—to make on-line a part of your business day. Here we take a look at the major services of today's on-line world and how each fits into a new perspective: What was once on the cutting edge has entered the mainstream. Your modem is now an important professional tool, and we'll show you how to get the most from it **110**

America Online.....126
CompuServe Information Service.....128
Dow Jones News/Retrieval with MCI Mail.....128
GEnie.....150
Prodigy Interactive Personal Service.....158

Highlights.....112
Editors' Choice.....113
Suitability to Task.....114
Internet: The Undiscovered Country.....116

A Private Little Board.....122
Summary of Features.....143
The Next Generation.....148
On the Front Lines.....153

Cover photography by Ernie Friedlander

PC MAGAZINE March 15, 1994 Volume 13 Number 5

FEATURES

Hardware

14- and 15-Inch Monitors: Through the Looking Glass

Today's mainstream monitor is a 14- or 15-inch Super VGA–capable display.

BY DON CRABB

A year ago, the mainstream monitor of choice was a 14-inch VGA-only tube. Today, it's a 14- or 15-inch Super VGA display with a resolution of 800 by 600 pixels or better. With so many 14- and 15-inch monitors available, evaluating the field to determine which display best suits your needs is no easy task. To aid you in your quest, *PC Magazine* tests 54 of the current crop of 14- and 15-inch multifrequency monitors, priced from $299 to $799 .....**161**

Aamazing CM-1528.....176
Addonics C143.....176
Addonics C152/LR.....176
ADI Microscan 3G.....181
ADI Microscan 3GP Low Radiation.....181
ADI MicroScan 4G.....181
ADI MicroScan 4GP Low Radiation.....181
Amax Impression 3.....181
Amax Impression 5.....181
AOC Spectrum Series 4N.....182
AOC Spectrum Series 5S.....182
CTX 1561LR.....182
Darius HRN-14VLP.....187
Darius HRN-15VLP.....187
Digital PCXBV-DE.....187
Digital PCXBV-BC.....187
ETC ViewMagic CA-1464SP.....189
ETC ViewMagic CA-1565SP.....189
GoldStar Model 1510.....189
Hyundai HCM-447E.....194
IBM 14P Color Monitor.....194
IBM 15P Color Monitor.....194
KFC CM-1428MD2.....200
KFC CA-1508.....200
Liberty CL-9015.....200
MAG DX15F.....202
Mitsuba M715VS.....202
Sceptre CC-615L.....202
Mitsubishi Diamond Scan 15FS.....207
Nanao FlexScan F340iW.....208
NEC MultiSync 3V.....209
NEC MultiSync 4FGe.....209
Nissei Sangyo/Hitachi SuperScan 15s.....211
Nokia Multigraph 44BS.....214
Nokia Multigraph 449E.....214
ZDS ZCM-1440-UT.....214
ZDS ZCM-1540-UT.....214
Optiquest 1500D.....217
Orchestra MultiSystems' The Trombone.....218
Orchestra MultiSystems' The French Horn.....218
Packard Bell PB8549SVGL.....219
Packard Bell PB8515SVGL.....219
Philips Brilliance 15.....220
Relisys RE-1564.....221
Relisys TF-1560.....221
Sampo AlphaScan Plus.....223
Sampo AlphaScan 15.....223
Sampo AlphaScan 15e.....223
Samtron SC-528UXL.....224
Sigma Designs Ergo View 15.....224
Sony CPD-1430.....228
TVM Low Radiation 4A+.....230
ViewSonic 15.....230
Wen JK1565 Color Monitor..231

Editors' Choice.....163
Highlights.....165
Performance Tests.....168
Summary of Features.....207

Software

Personal Tax Preparation: Dancing to a New Tune

BY TED STEVENSON AND KATHY YAKAL

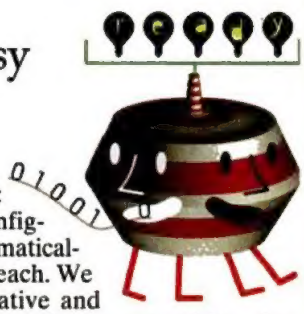
Amid a crescendo of fear and uncertainty, a brand-new tax code has been orchestrated. The ten tax preparation packages reviewed here can help you keep in step **235**

AM-Tax Personal 1040.....238
Andrew Tobias' TaxCut for DOS.....240
Andrew Tobias' TaxCut for Windows.....240
CA-Simply Tax for DOS.....255
CA-Simply Tax for Windows.....255
Personal Tax Edge for DOS..255
Personal Tax Edge for Windows.....255
TaxPerfect Personal 1040.....259
TurboTax for DOS.....260
TurboTax for Windows.....260

Highlights.....236
Editors' Choice.....237
Suitability to Task.....238
New Tax Laws: What's in Store?.....242
Summary of Features.....244

Hardware

Plug and Play: Easy Upgrades at Last



BY HOWARD ALEXANDER

It's the PC industry's Holy Grail: systems and peripherals that configure themselves invisibly and automatically. And finally it may be within reach. We look at the Plug and Play initiative and examine its potential to simplify everything from ISA-card setup to SCSI configuration without obsoleting your existing hardware **267**

Highlights.....268
How Plug and Play Works.....274

Computers

Application Servers: At Your Service

BY JIM SEYMOUR

Powerful yet affordable, application servers are rapidly replacing expensive minicomputers and mainframes as the business-computing backbone of choice. *PC Magazine* puts five of the most powerful PC-based application servers it has ever reviewed through a battery of tests to gauge just how far this new generation of Pentium- and 486-based servers has come **277**

AST Manhattan SMP P/60.....300
Compaq ProLiant 2000 5/66 M4200A.....301
HP NetServer 5/60 LM.....305
Unisys PW2 Advantage Plus Model 5608.....306
Wyse Series 7000i Model 760MP.....308

Highlights.....278
Editors' Choice.....279
Suitability to Task.....287
Price/Performance Index.....288
Performance Tests.....294
Summary of Features.....302

PC —Available on PC MagNet.

PC TECH

User-to-User

BY NEIL J. RUBENKING

PC MAGNET Browse through all the pages of a Windows program's help, even if the program doesn't include a browse button; a batch file that counts the number of times it's been run, without using additional files 309

Tutor

BY JEFF PROSISE

What's on Top? Windows' Z-Order Figures It Out 311

Extending Your Apps

BY GUY J. GALLO

Distributing Word for Windows Macros 317

Toolkits

BY REX CONN

Programming for OS/2 with Gpf 321

Environments

BY CHARLES PETZOLD

The Windows NT Path Functions 322

Utilities

PC MAGNET BY DOUGLAS BOLING

ThinDisk: A Fat Trimmer for Disks 327

Application servers to base a modern local area network on (page 277).

PC SOLUTIONS

Operating Environments

Prevent users from changing the system time with the TIME and DATE commands; a bug in Windows' File Manager concerning write-protected floppy disks; an AUTOEXEC.BAT for use in Windows DOS boxes 333

Word Processing

Getting the CD-ROM version of WinWord's help, even if you don't have the WinWord disk in your CD-ROM drive 337

Spreadsheets

Calculating the appropriate severance pay relative to years of employment and accrued vacation time 338

Databases

A streamlined version of a FoxPro function that calculates the corresponding Julian date 348

Graphics

Choosing a PC-based textile design system 356

Strange things are afoot in the office (page 456).

AFTER WORDS

After Hours

- **Story time:** five interactive tales for the kids to enjoy
- Play chess with Gary Kasparov
- Taxi drives you all around town
- Go on a 3-D Dinosaur Adventure 451

Abort, Retry, Fail?

BY DON WILLMOTT 456

ALSO IN THIS ISSUE

Direct Marketing Connection 333
Marketplace 405
Premier 405
Classified 420
Business Cards 433
Reader Service Card 409
Index to Advertisers 445
Advertisers' Product Index 446
Coming Up 448
Editorial Product Index 449

Semi-pro.

HP ScanJet II CX

If you're a sophisticated scanner user, you shouldn't have to settle for a semi-sophisticated scanner. Not when the EPSON 800C Pro/PC has so much more to offer. More versatile controls. More powerful software. Better connections. Stronger support. More flexible options. All of which makes this 800 dpi scanner the one that will actually live up to your

*One-year warranty, extendable to two years with return of registration card, at no charge. EPSON, HP, Macintosh, and Picture Publisher are trademarks or registered trademarks of Seiko EPSON, Corp., Hewlett Packard Co, Apple Computer, Inc., and Micrografx respectively. All other trademarks are the property of their owners. ©1993 EPSON America, Inc., 20770 Madrona Ave., Torrance, CA 90503. For dealer referral or warranty details, call **800-BUY-EPSON** (800-289-3776). In Canada, call **(800) GO-EPSON**. For Latin America, **305-265-0092**.

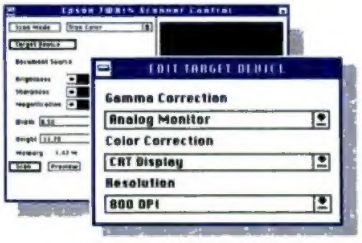
Pro.

The 800C Pro/PC is solidly backed by EPSON's one-year warranty extendable to two years. HP's warranty is one year.*

The 800C Pro/PC comes with both parallel and SCSI interfaces so you can connect it to two PCs or a PC and a Mac simultaneously. The ScanJet II CX connects to one computer.

EPSON's transparency unit and document feeder are powerful options that work across every scanner in our line. HP's scanner options aren't that flexible.

The 800C Pro/PC package includes the powerful full version of Picture Publisher 4.0, the industry's top-rated image editing software for the PC. HP's software is limited.



Only EPSON has color and gamma correction settings built right into the scanner hardware.

If you need technical assistance, you can call the pros at the EPSON Connection, our toll-free help line.

The scanning pros at PC Computing were so impressed with the 800C Pro/PC, they gave it their "Best Buy" award.

EPSON 800C PRO FOR PC

exacting professional standards. For our free booklet on scanning, or more information on the 800C Pro/PC, our other scanners for PCs and Macintosh, or our full line of personal printers, call the EPSON Connection at **1-800-BUY-EPSON** (800-289-3776). And get the scanner that's in a league of its own.

EPSON®

PC MAGAZINE

Editor-in-Chief Michael J. Miller
Editor Robin Raskin
Executive Editors Rick Ayre, Bill Howard

Director, PC Labs C. James Galley III **Art Director** David Herbick

Senior Networking Editor Frank J. Derfler, Jr.
Senior Editors Christopher Barr (West Coast), David Greenfield (Networking and Communications), Dale Lewallen (Technical Columns), Don Willmott (First Looks)

Managing Editor Paul B. Ross **Assistant Managing Editor** Dianne H. McDonald

Senior Associate Editor Brian Nadel (PCs) **Associate Editors** Gayle C. Ehrenman (After Hours), Leon Erlanger (Hardware), Carol Levin (Trends), Thomas Mace (Applications Development), Gail Shaffer (Networking and Communications), Ted Stevenson (Software), Sharon Terdeman (Technical Columns), Lance N. Ulanoff (Graphics) **Technical Editor** Neil J. Rubenking **Senior Production Editors** Shari L. Girouard, Kim Schueler **Copy Chief** Glen Boisseau Becker **Staff Editors** Tin Albano, Jamie M. Bsales, Kathleen Caster, John Clyman, Vicki B. Jacobson, Andrew C. Kantor, Ellyn J. McCasland, John Moore, Michael W. Muchmore, Michael Ryan, Craig L. Stark, Carol A. Venezia **Senior Writer** Robert S. Anthony **Staff Writer** William P. Flanagan **Assistant Editor** Anush Yegyazarian **Senior Copy Editors** Jeanne Albrecht, Robin B. Bornstein **Copy Editors** Elisabeth H. Holzer, Jill Léger, Joseph N. Levine, Ann Ovodow, Michele Pepe **Assistant Copy Editors** Jay Amster, Asa Somers **Layout Manager** Linda Harms **Assistant Layout Manager** Shelly Fierston **Senior Layout Editors** Thomas DeVito, Lillian Gaffney **Librarian** Thomas W. Giebel **Library Assistant** Dolores Williams **Senior Editorial Researcher** Adam A. Hicks **Editorial Researchers** Mary E. Behr, Angela Hickman, Brendon M. Macaraeg, Brad Stilwell, Jodi L. Wynblatt **Editorial Assistant** Melissa J. Perenson **System Support Manager** Craig Ellison **PC Support Analyst** Melvin Acevedo **Production System Support Manager** Patricia Perkowski **Communications Manager** Diana Garelik **Assistant to the Editor-in-Chief** Tara Solon **Assistant to the Editor** Rita Aprahamian **Assistant to the Executive Editors** Christina M. Evelyn **Administrative Assistant** Christina Okang **Support Associate, PC MagNet** Louise Laberge **Sysop, PC MagNet** Ken Hipple

Contributing Editors Bill Machrone (Publishing Director), Douglas Boling, Bruce Brown, Sheryl Canter, Ray Duncan, John C. Dvorak, Mitt Jones, Nick Lippis, Michael J. Mefford, Edward Mendelson, Bill O'Brien, Charles Petzold, Alfred Poor, Jeff Prosise, John R. Quain, Sal Ricciardi, Winn L. Rosch, Joe Salemi, Jim Seymour, Richard Hale Shaw, Barry Simon, Luisa Simone, Craig Stinson, M. David Stone, Ethan Winer

Associate Art Directors Lisa A. Sergi, Charles Conover, Curtis M. Fields, Donna Panagakos **Assistant Art Director** Robin L. Malik-Gomes **Associate Graphics Director** David Foster **Graphic Artist** Josef Pusedu **Assistant to the Art Director** Frieda T. Smallwood **Contributing Photographer** Thom O'Connor

Technical Directors Ben Z. Gottesman (Software), Nick Stam (Hardware) **Testing Coordinator** Steve Buehler **Project Leaders** Jeffrey D. Baher (Network First Looks), Amarendra Singh (Software), Robert P. Lipschutz (Networking and Communications), Jeff Mace (Graphics), Jay Munro (Applications Development), Tami D. Peterson (PCs), Michael J. Zulich (Hardware) **Programmers** Richard V. Dragan, Suchate Prakobchati **Product Testing Manager** Charles Rodriguez **Technical Analysts** Daniel A. Begun, Laura Cox, Richard Fisco, John Garris, Margaret A. Piemonte, Dan Smith, Ryan Tabibian **Support Technicians** Peter Bastide, Marino Delzotto, Constantine Fotopoulos, Deval Shah **Operations Manager** John R. Delaney **Inventory Control Coordinators** Mark Randall, Rob Graydon, William Pagan **Administrative Assistant** Olga Morilla

Publisher Jim Stafford

Associate Publishers Anna Zornosa (West Coast), Daniel Rosensweig, Michael Perkowski (Marketing), Michael Wiener (Networking) **Advertising Director, East Coast** Lon Otremba **National Sales Manager** Bill Stephen **Sales Development Manager** Susan Federspiel **Client Services Managers** Steve Robinson (Systems), John Wisdom (Advertising) **Research Director** Michael Van Engen **Assistant Research Manager** Scott Gibson **Promotion Manager** Lisa DiBenedetto **Events Manager** Dawn Gudelis

Senior Advertising Production Manager Lori Iaccino **Advertising Production Manager** Pamela Berkowitz **Assistant Advertising Production Managers** Susan Conrad, Robert Joy **Senior Coordinator, Edit Production** Jo-Ann Hirschel **Coordinator, Edit Production** Mark Baard

Advertising Office: One Park Ave., New York, NY 10016-5802; 800 33 MAG AD, 212-503-5100

Ziff-Davis Publishing Company
Chairman and CEO Eric Hippeau
President J. Scott Briggs
President, Ziff-Davis Domestic Publications Group Ronni Sonnenberg
Executive Vice President, Centralized Operations Group Mike Edelhart
Executive Vice President, International J.B. Holston III
Group Vice President, Controlled Circulation Publications Claude P. Sheer
Group Vice President, Paid Circulation Publications Jeff Ballowe
Senior Vice President, Circulation Baird Davis
Senior Vice President, Marketing Paul H. Chook
Senior Vice President Rachel Greenfield

Vice Presidents Bob Bader (Central Advertising Sales), James F. Ramaley (Circulation Services), Howard D. Sckolnik (Controller), Herbert Stern (Creative Services), Frank Kelcz (Europe), Rayna Brown (Human Resources), Ann Pollak Adelman (Marketing Services), Robert Ziff (New Projects and Strategic Planning), Dirk Ziff (Operations), Roger Herrmann (Production), Rolf Wulfsberg (Research), Bill Machrone (Technology) **Vice President/Managing Director Magazine Networks** Joseph Gillespie **Vice President, Assistant to the Chairman** Tom McGrade **Vice Presidents** Jim Stafford, Don Byrnes **Chief Information Officer** Wellington Y. Chiu **General Manager** Bruce Bourne **Executive Director, Information Systems** Owen Weekley **Executive Director, Marketing Services** Jim Manning **Directors** Jean Lamensdorf (Licensing), Gary A. Gustafson (Planning), Walter J. Terlecki (Production), Susan Delman (Corporate Marketing), Lewis D'Vorkin (Editorial), Bill Catchings (Codirector ZD Benchmark Operation), Mark L. Van Name (Codirector ZD Benchmark Operation), Alicia Marie Ivans (Direct Marketing Programs), Gregory M. Jarboe (Public Relations)

Ziff Communications Company
Chairman Emeritus William B. Ziff, Jr.
Chairman and CEO Eric Hippeau
Senior Vice President and Chief Financial Officer Bruce Barnes
Senior Vice President Steven C. Feinman
Vice President, General Counsel, and Secretary J. Malcolm Morris
Vice President, Business Manager T.L. Thompson
Vice President, Chief Information Officer Thor Olson
Controller and Treasurer Timothy J. Mitchell

Subscription Inquiries, Address Changes

Subscription Services: For subscription service questions, address changes, or ordering information, call toll-free 800-289-0429 in the U.S. and Canada; all other countries, please contact Ireland: 353-61411466 or fax 353-61419457. Or write to *PC Magazine*, P.O. Box 54093, Boulder, CO 80321-4093.
Subscription Rate: The subscription rate is $44.97 for a one-year subscription (22 issues). Canada and all other countries, please add $36.00 for postage.
Back Issues: For back issues (subject to availability), $8 per issue ($9 outside the U.S.), send check or money order to Back Issues Dept., Ziff-Davis Publishing Company, P.O. Box 53131, Boulder, CO 80322-3131.
Computer Select: *PC Magazine* is available on Computer Select, a CD-ROM published by Computer Library. For subscription information, call Computer Library at 800-827-7889, ext. 708.

How to Contact the Editors

We welcome letters. However, we cannot look up stories from past issues, recommend products, or diagnose problems with your PC by phone. Send your written questions, complaints, and compliments to *PC Magazine*, One Park Ave., New York, NY 10016-5802. Please include a daytime telephone number. Send electronic mail to MCI Mailbox 157-9301, to CompuServe address 72241,104, Internet address 157.9301@mcimail.com, or to PC MagNet (see below). *PC Magazine*'s general number is 212-503-5255. The West Coast Operations number is 415-378-5500.

If you are dissatisfied with a product advertised in *PC Magazine* and cannot resolve the problem with the vendor, write (do not call) Jennifer Roth, Advertising Department, at the above address. Include copies of your correspondence with the vendor.

PC Magazine does not accept unsolicited manuscripts. We will pay $50 for Solutions and Programming user tips and for Abort, Retry, Fail? submissions. If you submit artwork or newspaper clippings with Abort, Retry, Fail?, mark up the photocopy, not the original.

PC MagNet

PC Magazine operates PC MagNet, an on-line service of ZiffNet, hosted by CompuServe. To join, set your communications software for 300, 1,200, 2,400, or 9,600 bits per second (bps), 7 data bits, even parity, 1 stop bit, and full duplex. To find the number nearest you, dial 800-346-3247. (In Canada, dial 800-635-6225, voice only.) When the modem connects, press Enter. At the Host Name prompt, enter PHONES. Follow the menus, note the number closest to you, then hang up and dial the number you have just found. At the HOST NAME prompt, enter CIS. At the USER ID prompt, enter 177000,5000. Enter PC*MAGNET at the PASSWORD prompt and PCMAG93 at the ENTER AGREEMENT NUMBER prompt. CompuServe members may join by typing GO PCMAG at any CIS ! prompt. ZiffNet membership is $2.95 a month, which includes access to *PC Magazine* Editors' Choice awards, Product Reviews Index, weekly news from *PC Week*, Buyers' Market, ZiffNet Highlights and Information, and the Support Forum. Connect-time charges vary according to the speed of the modem used. Billing is based on 1-minute increments.

To obtain this issue's utility free of charge: Dial 617-231-4450, with your modem, to access the PC Magazine Utilities BBS. Enter your name at the prompt, and follow the menus.

Permissions, Reprints

Material in this publication may not be reproduced in any form without permission. If you want to quote from an article or use *PC Magazine*'s logo in conjunction with an Editors' Choice designation, write Chantal Lavelanet; for information on reprints in quantities of 500 or more, write Carol Peters.

PC Magazine Reviews

Except where noted: All *PC Magazine* reviews are of currently available products. Benchmark and performance tests are run on Compaq Deskpro 386/25s and 25c's.

Editorial and Business Office: One Park Ave., New York, NY 10016-5802. Editorial: 212-503-5255; Advertising: 800 33 MAG AD, 212-503-5100. *PC Magazine* is an independent journal, not affiliated in any way with International Business Machines Corp. IBM is a registered trademark of International Business Machines Corp. Entire contents copyright ©1994 Ziff-Davis Publishing Company, L.P. All rights reserved; reproduction in whole or in part without permission is prohibited. The following are registered trademarks of Ziff-Davis Publishing Company, L.P.: PC, *PC Magazine*, PC Labs, PC MagNet, PC Magazine Award for Technical Excellence, PC Magazine Editors' Choice Award. The following are trademarks of Ziff Publishing Company, L.P.: Abort, Retry, Fail?; Advisor; Direct Marketing Connection; First Looks; Lab Notes; New and Improved; PC Marketplace; The PC Utilities; Pipeline; Power Programming; Power User; Read Only; Spreadsheets; Trends; Tutor; User-to-User; The Working Word.

PRINTED IN THE U.S.A.

Copyrighted material

ANNOUNCING!

Corel Ventura

The Best in Publishing!

Includes:

- Ventura Publisher™ 4.2
- Ventura DataBase Publisher™ 4.2
- Ventura Scan™
- Ventura Separator™
- 75 Style Sheets
- 600 Fonts
- 10,000 Clipart Images
- 100 Great Photos on CD-ROM
- Support for Adobe™ Acrobat™

Ideal for:

- Documents
- Books
- Flyers
- Newspapers
- Journals
- Magazines
- Reports
- Manuals
- Brochures

Incredible Value and Power!

Corel Ventura gives you the most powerful, automated, value-packed Windows publishing software you can buy — nothing else comes close! It includes the recently updated **Ventura Publisher 4.2** with fast font loading and support for Adobe Acrobat, plus the ability to automatically create Hypertext links in your Acrobat documents (Adobe Acrobat Distiller required). Incomparable in power for longer documents, Ventura Publisher is also ideal for projects of all sizes thanks to its versatility and user-friendly interface. In addition to this comprehensive publishing software, you'll also receive **Ventura DataBase Publisher** that lets you publish DTP or word processing documents from database information quickly and easily; **Ventura Separator** for complete color prepress capabilities; and **Ventura Scan**, a bonus scanning utility. Plus, you'll find all the extras you've come to expect from Corel, including a complete library of 600 fonts and more than 10,000 clipart images on CD-ROM, plus a CD-ROM sampler of over 100 photo images.

FROM THE CREATORS OF CorelDRAW & Corel PHOTOS on CD-ROM

Corel Ventura™ — The Best in Publishing!

Call for the location of the Egghead Software store nearest you. To order directly from our Eggxpress Ordering Service, please call 1-800-EGGHEAD.

EGGHEAD SOFTWARE
North America's Software Experts.

1-800-EGGHEAD

After CUE discount $162.50

KUR-0038

COREL (613) 728-3733

CIRCLE 322 ON READER SERVICE CARD

No other su
this common

WordPerfect is a registered trademark of WordPerfect Corporation within the United States and other countries. All other brand or product names are trademarks or registered trademarks of their respective companies.
© WordPerfect Corporation 1993.

ite can claim look and feel.

Introducing the Borland® Office 2.0.

Includes WordPerfect 6.0 for Windows, plus the Workgroup Editions of Borland Quattro Pro 5.0 for Windows and Borland Paradox 4.5 for Windows.

PC Computing's Most Valuable Products award—no other suite has one. The Borland Office has three.

This new suite integrates the most award-winning products of all time. In the categories you want most—word processing, spreadsheet and database. You only get software you want to use. Not shelfware.

Truly the best-of-breed products.

When you buy the Borland Office, you get WordPerfect® 6.0 for Windows,™ the world's first document processor with integrated text, graphics and data; Borland Quattro® Pro 5.0 for Windows, the easiest-to-use spreadsheet with the most analytical functions and graphical tools available; and Borland Paradox® 4.5 for Windows, the best-selling PC database featuring built-in SQL connections to all the popular database servers for instant, easy access to your data.

A new level of integration.

You want products that work well together. Ours do. With PerfectFit Technology, they have common icons, button bars, and cross-application macros, as well as resources like spell checking. So each product "looks and feels" the same.

And where other suites stop at integrating your applications with OLE, we also integrate your people. The Borland Office is the only suite that's workgroup-ready right out of the box. So you can automatically share data. Anywhere.

The Desktop Application Director lets you access applications and common tasks at the click of a mouse.

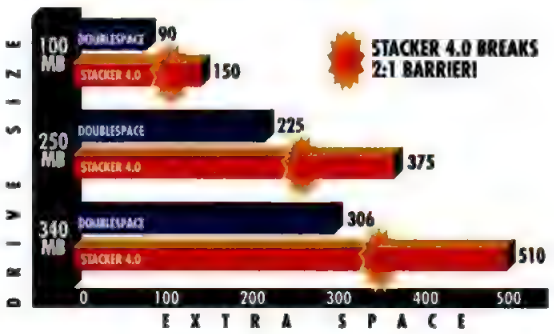
The easiest upgrade for DOS.

The Borland Office gives you the ease of a single installation procedure, "coaches" that teach you, and the best compatibility with DOS products. Plus, we offer the best technical support in the industry.

So making the move is easy. And with the best-of-breed products, you'll be glad you did. Visit your local reseller, or call us at (800) 526-5164 today.

Borland WordPerfect®

Here's the deal (compressed version): We'll beat anybody, guaranteed. ■ No catch, no special conditions. New Stacker® 4.0 for Windows & DOS will simply give you more extra disk space than any other compression software, or we'll refund your money. Period. ■ Only Stacker 4.0 breaks the 2:1 compression ratio barrier, combining Stac's patented Stacker LZS™ technology with Stacker SmartPack™ to store data more efficiently. Stacker's superior compression also allows you to store up to 3.5MB on floppy disks. ■ And the most powerful compression software is also the most full-featured



INTRODUCING IF IT PERFORMS THE COMPET GIVE YOU YOUR

© 1994, Stac Electronics. Stac and Stacker are registered trademarks of Stac Electronics. Stacker SmartPack, Stacker are trademarks of Microsoft Corporation. Novell Yes: Developer tested only. Novell makes

and most reliable. For instance, Stacker 4.0 gives you instant access to its tools within Windows, so managing your drives is easier than ever. Just point and click—Stacker's new toolbar, drive bar and gauges will put you in command of your data. ■ Stacker 4.0 even automatically optimizes itself for your particular data, giving you the maximum compression possible. And Stacker 4.0 also requires substantially less DOS conventional memory than before. ■ To safeguard your data, new Stacker AutoSave™ automatically backs up your important file system information. ■ Get new Stacker 4.0 today from your local reseller, or call **1-800-522-STAC (7822)** ext. **6203** for information. Stacker. It's guaranteed to put the squeeze on ordinary compression software.

yes It runs with NetWare

STAC®

STACKER 4.0. ANYTHING LIKE ITION, WE'LL MONEY BACK.

LZS and Stacker AutoSave are trademarks of Stac Electronics. Microsoft, MS-DOS, DoubleSpace and Windows no warranties with respect to this product. From outside the U.S., call 619-431-6712.

CIRCLE 061 ON READER SERVICE CARD

A Star is Born.

Samtron SC-428UXL 14" High Resolution (75Hz) Color Monitor

- *Multi-Scan*
- *1,024 x 768 (75 Hz) High Resolution*
- *Super Fine 0.28 Dot Pitch*
- *Digital Controls*
- *Power Saving*
- *VGA, SVGA, XGA VESA Compatible*
- *Flicker-Free*
- *Low Emission, MPR II*
- *Non-Interlaced*
- *3-year Limited Warranty*

Starpower. It is a quality that makes some shine brighter than others. It is a word reserved for describing those who lead their peers. It is what symbolizes Samtron's commitment to building monitors that incorporate leading-edge technology with the reliability necessary to meet the demands of day-to-day use. ★ Samtron now introduces the new SC-428UXL 14" Color Monitor, the first of the new StarPower™ line. Designed for users of Windows™ and other leading business applications, it features 1,024 x 768 (75 Hz) High Resolution, Digital Controls, Power Saving, and Low Emission Protection. Like other Samtron Color Monitors, it is VGA, SVGA and VESA compatible, as well as complying to the United States EPA Energy Star™ standards. ★ Thousands of users depend upon Samtron monitors because of their accuracy, reliability, and value. Samtron's new SC-428UXL will make you a star. Call your Reseller today.

SAMTRON
MONITORS WITH STARPOWER™

CIRCLE 296 ON READER SERVICE CARD

SAMTRON DISPLAY, INC. 14251 E. FIRESTONE BLVD. #101 LA MIRADA, CA 90638 TEL: 310 802-8425 FAX: 310 802-8820 CUSTOMER SERVICE: TEL: 1800) SAMTRON. DISTRIBUTORS: CANADA, TEL: (416) 858-3000 MEXICO TEL: 011 525-325-0993

The EPA Energy Star™ emblem does not represent EPA endorsement of any product or service. Specifications subject to change without notice. VGA is a trademark of International Business Machines Corp. Ltd. Windows is a trademark of Microsoft Corp. Screen images simulated.

Letters

TECH EX—PAST AND PRESENT

Giving Lotus Improv 2.1 an Award for Technical Excellence in the applications software category is laughable ("The 10th Annual Awards for Technical Excellence," December 21, 1993).

Such gushing language: "Biggest shift in spreadsheet thinking since the creation of Lotus 1-2-3," and "Improv was the pioneer."

Where were your current editors in 1985 when Javelin was given your award? Javelin was the true pioneer, having the greatest effect in shifting the way we think about spreadsheets. Lotus merely borrowed Javelin's original ideas for multidimensional spreadsheets.

Bert Hoffman
Oceanside, New York

Having just read your list of past Awards for Technical Excellence winners, I noticed that Microsoft Windows 3.0 is not mentioned. This single product transformed the entire industry and surely should have been listed.

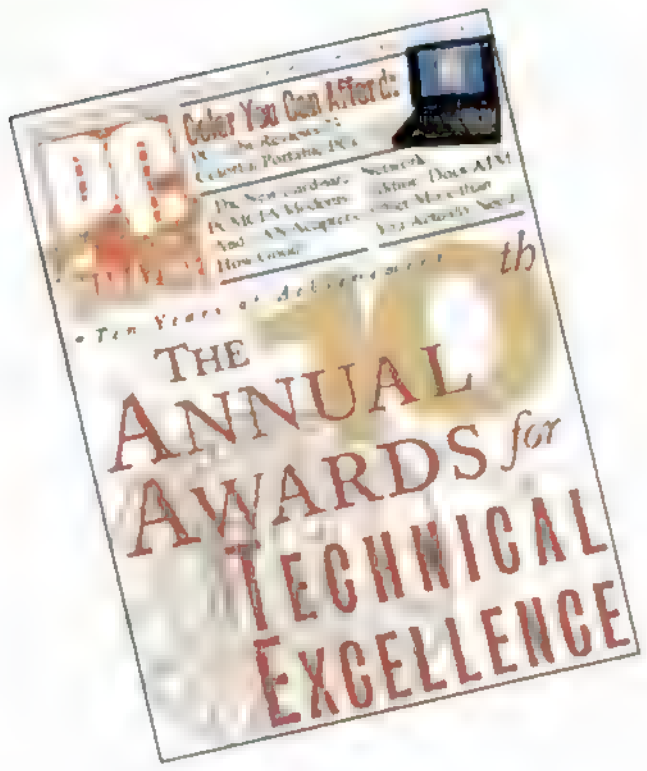
John Dickson
Santa Barbara, California

OF BENCHMARK TESTS AND BIASES

I just finished reading about Winstone 94, Version 1.0, *PC Magazine*'s new benchmark test developed with Microsoft's help, and I must say that I am now skeptical. How can you claim that you are "The Independent Guide to Personal Computing" when Microsoft had its hand in the building of your test programs? I'm afraid that no matter how many Bibles you stack up to swear on, I can never again believe that your reviews are unbiased, especially when they're related to Microsoft products.

James Parker
Old Bridge, New Jersey

• Microsoft is the vendor of the Windows operating environment, the one in which the Winstone test runs. We sought certification from Microsoft for this benchmark test. That certification does not, however, mean that Winstone 94 is a Microsoft marketing tool.



Who were the true pioneers of multi-dimensional spreadsheets?

Winstone 94 is an independent tool for testing the performance of PCs running Windows 3.1 and Windows 3.1–based applications. The Ziff-Davis Benchmark Operation wrote the Winstone nonapplication code. Seven different vendors have applications in Winstone 94; only 5 of its 12 applications are from Microsoft. We based the presence of each application in Winstone 94 on market-share data.—Ed.

The greatest failure of PC Bench 8.0, WinBench 4.0, and Winstone 94 is that they do not test multitasking performance of the equipment or the application. Furthermore, your tests, which are tied to only one vendor's API, evaluate the wellness of drivers for that vendor's product and ignore the drivers for other vendor's systems.

William L. Hartzell
Garland, Texas

• PC Bench 8.0 measures the performance of PCs running DOS. WinBench 4.0 and Winstone 94 measure the performance of PCs running Windows 3.1. Neither of those operating environments is a true multitasking environment, so none of these benchmark test suites are built to test multitasking. We base our development of publicly available benchmark tests on market share, and to date, the market has voted overwhelmingly for DOS and Windows 3.1 in the PC arena. We are investigating the development of benchmark tests for other platforms. —Ed.

SLY FOX

Your December 21, 1993, review of *Using FoxPro 2.5 for Windows* by Lisa Slater and Steven Arnott (Read Only, "Literature for Developing FoxPro Cunning") omitted one key point that I unfortunately discovered only after buying the book. Buried on the unnumbered second page of the Conventions section are the admission that the book is not based on the shipping version of FoxPro 2.5 and an accompanying warning that "if you have trouble duplicating the results you see in the examples, your problem may be because of your build date." In case you think they are kidding, you have only to get to the first figure (1.1), in which the screen shows "FPR" rather than "FOXPROW," as it actually is in the program. What is the poor, unsuspecting consumer who bought the book supposed to do when something doesn't work as described? Ask Microsoft for the beta version?

Virgil I. Johannes
Holmdel, New Jersey

NATURE'S BOUNTY

A brief in the December 21, 1993, New & Improved column stated that 10 percent of the proceeds on the sale of Second Nature Software's Windows wallpaper and screen-saver art collections are going to benefit the nonprofit organization The Nature Conservancy. Actually, Second Nature Software is donating all profits or 10 percent of sales, whichever is greater.

This is a total and extraordinary commitment on Second Nature Software's part in support of The Nature Conservancy's worldwide efforts to conserve our natural heritage.

Russell S. Hoeflich
The Nature Conservancy
Portland, Oregon

Remember when color TVs suddenly became affordable? Can you say déjà vu?

Unless you still watch a black and white TV and listen to 8-track tapes, price is probably the only thing stopping you from getting a color notebook. In which case, we'd like to introduce you to the Bravo NB. Not just because it's affordable, but also because it has features you normally don't find on notebooks costing hundreds more. Like the most advanced Dual Scan STN technology, which gives you 256 bright, clear colors on a full-size 9.5" screen. To make sure you won't have to wait to see those colors, it has a powerful Intel 25MHz 486SX microprocessor, local bus video and 512KB video memory. It also has 4MB RAM that can be expanded to 20MB and up to a 170MB hard drive. There's even a Type III PCMCIA expansion slot so you can send or access information from anywhere, as well as enough other features to fill that column to your right. And since our resellers perform as well as our computers, you can get one right away by calling 800-876-4AST.

All of which should make choosing a color notebook as simple as, well, black and white.

AST. COMPUTER

©1994 AST Research, Inc. All rights reserved. AST, AST logo are registered trademarks and ExeCare is a trademark of AST Research, Inc. The Intel Inside logo is a

Dual Scan STN color for under $2,400.

BRAVO NB

POWERFUL

Intel 486SX/25 microprocessor with integrated 8KB cache. Pre-installed DOS 6.0, Windows 3.1, and B-Tools business utility software. Environmentally friendly NiMH battery pack for extended usage.

ERGONOMIC

Just 6.2 pounds and 1.7 inches high. Integrated trackball, silent travel keyboard with 12 function keys.

CUSTOMIZE

Dual Scan STN color models starting under $2,400. Active-matrix color and monochrome models also available.*

EXPANDABLE

4MB RAM standard, expandable to 20MB. Hard drive upgradable to 170MB. PCMCIA Type III enhancement cards.

RELIABLE

ExeCare™ Plus: one-year warranty with free 48-hour expedited repair. Technical assistance 24 hours a day, seven days a week.

energy

EPA POLLUTION PREVENTER

intel inside

Call for more information and the nearest reseller.

800-876-4AST

*registered trademark of Intel Corporation. All other trademarks are the property of their respective owners. *Estimated U.S. reseller selling price. Reseller pricing will vary.*

LETTERS

TABS 'R' NOT US

I chuckled over John C. Dvorak's January 11, 1994, Inside Track comment about watching a training film on tab stops. Dvorak notes, "I thought this to be the dumbest thing I've seen in a long while," and follows up by querying, "What skill does it take to use a tab?"

After a decade of training and supporting everyone from clerical to upper-level-management PC users, I have found the most dreaded, abused, and confusing feature for users to learn is tabs, and some users even suffer from "tabophobia," avoiding the Tab key altogether in favor of the Spacebar. Although software companies have gone to extraordinary lengths to make the tab feature easier to use, there are a host of options (probably more than 20) in which a user must become fairly skilled. Perhaps a film dedicated to tabs isn't such a dumb idea after all.

Sandra J. Wagnon
McKinney, Texas

FORUMS OFFER SUPPORT ALTERNATIVE

In your January 11, 1994, discussion of the move to paid technical support (Trends, "The Painful Move to Paid Support"), you do not mention the on-line support provided on CompuServe, America Online, and other on-line services, and how this alternative means of providing support fits into vendors' bigger picture.

Each of the programs I use is supported in a forum on CompuServe, and the quality of support varies, ranging from good to superb. In some cases, the support is provided by employees of the company, while in others, it is volunteered by other on-line users.

Although the software forums are not included in CompuServe's basic service price, the cost of posting a support request and later downloading the response is small. I get all my technical support this way, even for programs that still offer an 800 number and free telephone support.

Ed Wiggins
via PC MagNet

CLAMORING FOR MORE

Upon reading Robin Raskin's December 21, 1993, Pipeline column ("Software, L.L. Bean Style"), I immediately contacted Club KidSoft for a subscription to its magazine and CD-ROM on behalf of my children. Though the Windows installation went smoothly, the software was easy to navigate, and the included activities were mildly amusing for my 9- and 12-year-old children, we wished there were more of both games and interactive product demos that lasted longer so that we could get a feel for whether there was really a product we wanted to purchase.

Alan Zisman
via PC MagNet

Although CompuServe's software-support forums aren't included in the basic service price, the cost of posting a support request and downloading the answer later is small.

SOFTWARE INCLUDED

I recently bought a Compaq Presario 425. In the short time I've had it, I've been impressed with its features and abilities, and yes, the preloaded software got me up and running in about 30 minutes. But there's one problem. The only disk that came with the system was a diagnostics disk. When I called Compaq about getting a set of original disks for all the preloaded software, I found out there would be an additional cost.

Knowing that all too often problems arise that can be solved only by reinstalling the software, I wonder if Compaq plans to send out a technician with disks to do it for me.

Jeff T. Goodlin
Pasadena, Maryland

REDUCING CORPORATE HAND-HOLDING

Bravo for Sal Ricciardi's December 7, 1993, piece, "A Solid Foundation for Your Corporate Applications," which marked the start of your Corporate Developer column. I have made this informative piece required reading for my in-house "clients," and it has really helped them to structure their requests with less hand- holding. I look forward to future articles, because I too am always learning.

Michael Welsh
via PC MagNet

SATISFACTION GUARANTEED

Several months ago I saw your report on customer satisfaction with computer companies ("Satisfaction amid Change," July 1993), and at that time, Zenith Data Systems ranked at the bottom of the list. I was one of those ZDS customers who agreed with those rankings, but since that time, ZDS has turned itself around and deserves to be at the top of the list, up there as one of the best in the business.

After multiple attempts to repair one of my portable computers, ZDS answered the call, replacing my old machine with two new top-of-the-line ZDS 486-based notebooks. I am now one very satisfied customer.

Alfred Jordan
Stonington, Connecticut

"ANTIQUE" IS A FIGHTIN' WORD

A Dell Computer ad in your December 21, 1993, issue says, "Imagine trying to pawn off a Pentium machine with a bus designed for a 286 antique!" Is a 286 an antique? And what about my 386? If I replace it now, how do I get back my investment? I know; I'll take it to the computer antique dealer and see what I can get for it.

Brian Davis
Fairbanks, Alaska

HOW TO WRITE TO PC MAGAZINE

We welcome your comments and suggestions. Please send your correspondence to Letters, *PC Magazine*, One Park Avenue, New York, NY 10016-5802, or upload it to PC MagNet (see page 12 for access information). All letters become the property of *PC Magazine* and are subject to editing.

WE JUST PUT MORE DISTANCE BETWEEN RLN AND OTHER REMOTE ACCESS SOLUTIONS.

For some time, Remote LAN Node® has been acknowledged as the best remote node solution you can buy, letting users dial into their LANs and work just as if they were locally connected. And it's been proven in use across the world. Now RLN™ 2.0 has really left the others in the dust.

RLN comes preconfigured on a rack-mountable 486 server for 4, 8 or 16 simultaneous users, or as software-only for 2-16 simultaneous users.

RLN now supports token-ring as well as Ethernet. In fact, you can access either one with the same client software. RLN is the only remote access solution that works in virtually any single or interconnected network environment.

There's also new SNMP support, and a built-in Windows™-based Remote Manager console for server management from any remote PC. You can also simultaneously update user information on multiple servers from a single location. And RLN has a Custom Client Build utility, so configuring your remote clients is easier.

yes it runs with NetWare

RLN has always included powerful security features. But now that we've added enhanced data encryption, password aging and support for Challenge Handshake Authentication Protocol (CHAP), it's the most secure solution you can buy.

So call for more information and a free demo copy of RLN software that will let you dial in and see what it's like to be a remote node. We'll also send you an informative white paper on remote computing.

Like RLN users the world over, you'll see what lengths we've gone to, to make sure no other remote solution comes close.

1-800-348-3221, ext. 57A*

DCA

The Freedom To Communicate.

Or call (404) 475-8380. © 1994 Digital Communications Associates, Inc. All rights reserved. DCA and Remote LAN Node are registered trademarks and RLN is a trademark of Digital Communications Associates, Inc. Windows is a trademark of Microsoft Corporation. All other trademarks are the property of their owners.

CIRCLE 901 ON READER SERVICE CARD

THE ZEOS® FREESTYLE... THE FLEXIBLE SYSTEM FOR YOUR EVERY POSITION.

The feeling of freedom is unrestricting and comfortable. It's also power and strength. The ZEOS Freestyle gives you freedom of movement, power, and so much more.

The only notebook on the market with the revolutionary tilt and swivel screen, the Freestyle allows you to adjust the screen to the perfect viewing angle–no matter what your position. Use it in your lap, on a plane or for presentations.

For maximum power, we've given you the option of 386SL or 486SL Intel processors and memory options from 2MB to 20MB. We've also included such features as a built-in mouse

Right Choices Are Hard.

Unique tilt and swivel display moves for your every position.

key, internal floppy drive, soft carrying handle and many power management features. In addition, we offer an array of accessories. At only 5.6 pounds, including the battery, you'll want to take it everywhere.

Full desktop power with movement. It's a flexible choice. Why not call us to enhance your position? Your Systems Consultant can be reached at 800-554-7172.

TOLL-FREE SUPPORT & WARRANTIES

We're here for you 24 hours a day, 365 days a year, and always a toll-free call away. All ZEOS systems come with a One Year Limited Warranty and a 30-Day Money-Back Guarantee. So call us now!

STANDARD WITH EVERY ZEOS FREESTYLE

- 25MHz 386SL, 25MHz 486SL or 33MHz 486SL Intel microprocessor.
- 386SL: 64K SRAM system cache 486SL: 8K internal system cache.
- RAM expandable to 20MB (486SL) or 10MB (386SL).
- IDE hard drive expandable to 260MB.
- 640 x 480 VGA backlit LCD display, 9.5" diagonal supporting up to 64 shades of gray.
- Unique tilt and swivel display.
- 256K (386SL) or 512K (486SL) video RAM.
- Supports an external SVGA color monitor with simultaneous display capability.
- Internal 3.5" 144MB floppy drive.
- Serial, parallel, video and PS/2 (for keyboard, mouse or 10-key pad) ports.
- 486SL includes 3.3V technology for added battery life, and a built-in math coprocessor.
- Replaceable and rechargeable NiCad battery.
- 81-key keyboard with built-in mouse key, "inverted T" cursor keys and dedicated Home, PgUp, PgDn, and End keys.
- AC adapter from AC110-240V to DC.
- Power-saving features.
- FCC Certified Class B.
- Complete ZEOS Customer Satisfaction Package.

PACKAGE 1	PACKAGE 2	PACKAGE 3
386SL-25: $995 Lease $42/month **486SL-25: $1495** Lease $63/month **486SL-33: $1695** Lease $61/month ■ 2MB RAM (386SL); 4MB RAM (486SL) ■ 60MB IDE hard drive (386SL); 120MB IDE hard drive (486SL) ■ MS-DOS 6.2	**386SL-25: $1495** Lease $63/month **486SL-25: $1795** Lease $65/month **486SL-33: $1995** Lease $72/month ■ 6MB RAM (386SL); 4MB RAM (486SL) ■ 120MB IDE hard drive (386SL); 180MB IDE hard drive (486SL) ■ Custom nylon carrying case ■ MS-DOS 6.2 ■ Microsoft Windows for Workgroups 3.11	**386SL-25: $1995** Lease $72/month **486SL-25: $2195** Lease $79/month **486SL-33: $2395** Lease $87/month ■ 10MB RAM (386SL); 8MB RAM (486SL) ■ 180MB IDE hard drive (386SL); 260MB IDE hard drive (486SL) ■ Internal 96/24 send/receive fax modem ■ Custom leather carrying case ■ Extra battery ■ External charging stand ■ MS-DOS 6.2 ■ Microsoft Windows for Workgroups 3.11

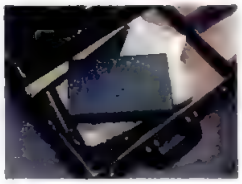
Purchase orders are subject to approval. Business leasing programs available. Lease prices based on a 36-month lease, 10% purchase option. All prices, specifications and availability are subject to change without notice, call to confirm these servicemarks; Freestyle is a trademark of ZEOS International Ltd. ©1994 ZEOS International Ltd., 1301 Industrial Blvd.,

THE ZEOS® CONTENDA™... THE TRAVELER'S DREAM AT AN IDEAL FARE.

What a dream! The ZEOS Contenda subnotebook is small enough to tuck away in your briefcase and so light you'll forget you have it! It's the perfect traveling companion.

All your business and home needs conducted in a bundle just shy of 4 pounds. Write letters and memos. Create presentations. Keep in touch with associates through an internal send/receive fax modem. Organize your files, calendar, planner and more.

What's more, with a standard 80MB hard drive, memory up to 10MB and your choice of a 386SL-25 or 486SL-25 Intel processor, the Contenda has plenty of power to run Windows. You'll also find you can work longer because the processor is intelligent enough to power-down the memory, disks, modem and more when they're not in use. In addition, the compact package includes a built-in trackball and high-resolution backlit screen.



Smaller than a notebook. Lighter than a hard-cover novel.

We've Made It Easy.

STANDARD WITH EVERY ZEOS CONTENDA

- 25MHz 386SL or 486SL Intel microprocessor.
- RAM expandable to 8MB (486SL) or 10MB (386SL).
- 486SL: IDE hard drive upgradable to 120MB.
- Display: 640 x 480 VGA backlit, .23 dot pitch. Sharp 7.4" diag., up to 64 gray shades.
- 256K (386SL) or 512K (486SL) video RAM.
- 486SL version includes 3.3V technology for added battery life, PI local bus for video acceleration, high-speed floppy drive controller, and built-in math coprocessor.
- Supports simultaneous display with an external SVGA color monitor.
- Replaceable and rechargeable NiMH battery.
- 80-key keyboard with embedded numeric keypad and easy-to-use built-in trackball.
- Serial, parallel and video ports, plus ports for internal fax modem and external floppy drive.
- AC adapter with full range from AC110-240V to DC.
- Fully-featured power management.
- 9.7" x 6.1"; 3.9 lbs.
- FCC Certified Class B; UL Listed.
- Complete ZEOS Customer Satisfaction Package.

PACKAGE 1	PACKAGE 2	PACKAGE 3
386SL Contenda: $995 Lease $42/month ■ 2MB RAM ■ 80MB IDE hard drive **486SL Contenda: $1395** Lease $59/month ■ 4MB RAM ■ 80MB IDE hard drive	**386SL Contenda: $1295** Lease $55/month **486SL Contenda: $1695** Lease $61/month ■ 4MB RAM ■ 80MB IDE hard drive ■ External 3.5" floppy drive ■ MS-DOS 6.2, Windows for Workgroups 3.11, Lotus Organizer	**386SL Contenda: $1595** Lease $58/month **486SL Contenda: $1995** Lease $72/month ■ 4MB RAM (386SL); 8MB RAM (486SL) ■ 80MB IDE hard drive ■ External 3.5" floppy drive ■ Custom leather carrying case ■ Extra battery ■ Internal fax modem ■ MS-DOS 6.2, Windows for Workgroups 3.11, Lotus Organizer

Computer Shopper readers' #1 Best Buy

It's a traveler's dream come true: The world at your fingertips in a mighty and tiny portable bundle. Don't get caught without it!

AWARD-WINNING SERVICE

ZEOS has won more *PC Magazine* Readers' Choice for Service & Reliability awards than any other company–five in all!

CALL NOW TOLL FREE

800-554-7172

24 HOURS A DAY

Fax Orders: 612-633-1325, Government: 800-245-2449, Hearing Impaired (TDD): 800-228-5389, Outside U.S. and Canada: 612-633-6131. Purchase Orders, MasterCard, VISA, Discover, Am Ex, Z-Card,® COD and affordable leasing programs. Open 24 Hours a Day, 365 Days a Year!

ZEOS INTERNATIONAL, LTD.

and warranty details. Prices do not include shipping. All products and company names are trademarks or registered trademarks of their respective holders. ZEOS and Contenda are registered trademarks; Z-Card and Computers Now! are registered Minneapolis, MN 55413 USA. ZEOS is a publicly traded company (NASDAQ symbol: ZEOS). FSSN-PCM-9403A

CIRCLE 063 ON READER SERVICE CARD

MEET ELOQUE

TO KNOW 1-2-3 IS TO LOVE AMI PRO.

COLLECT CHARTS AND RANGES FROM 1-2-3 AND DROP THEM INTO AMI PRO DOCUMENTS WITH A MOUSE CLICK

Ami Pro and 1-2-3 are beyond compatible. They're actually com

CHANGES TO 1-2-3 SPREADSHEETS ARE AUTOMATICALLY REFLECTED ON AMI PRO DOCUMENTS

AMI PRO AND 1-2-3 WORK TOGETHER TO HELP YOU WORK FASTER

PUT THE POWER OF 1-2-3 INTO WORDS.

Everyone knows Lotus® 1-2-3,® the most popular, most usable spreadsheet in the world. Now it's time you got to know Ami Pro,® the Windows™ word processor designed to complement 1-2-3.

Those who know Ami Pro know why it wins rave reviews from industry experts time after time. Like the fact that it's consistently rated easiest word processor to use.

THEY SHARE MORE THAN LOOKS

As impressive in words as 1-2-3 is in numbers, it also has special advantages for 1-2-3 users. Because it's the only word processor designed specifically to complement and enhance your spreadsheet. Ami Pro not only looks like 1-2-3, it behaves identically – with shared menus, common user interface, spell check dictionary and SmartIcons.® So if you use 1-2-3, you already know how to use Ami Pro.

The integration between the two is so complete that incorporating your 1-2-3 data into an Ami Pro document is automatic and almost instantaneous.

*Call for a list of eligible word processors. Education-priced Lotus products not included. Offer valid in U.S. only. Not to be combined with any other offer. Have you ... u qualify for a competitive upgrade. In Canada call **1-800-GO-LOTUS**. ©1994 Lotus Development Corporation, 55 Cambridge Parkway, Cambridge, MA 0214 and Lotus Organizer is a trademark of Lotus Development Corporatio

1-2-3's NT TWIN.

The unique Collect and Copy feature lets you quickly gather any number of charts or data ranges from any number of 1-2-3 files and arrange them within a single Ami Pro document, dynamically linked through OLE and DDE. You just click on the 1-2-3 Collect and Copy SmartIcon and Ami Pro instantly takes you into your spreadsheet and guides you through the process.

Plus, Ami Pro's Style Converter lets you use the same paragraph styles across both word processor and spreadsheet.

And Ami Pro is the only word processor that has complete file compatibility with 1-2-3 Release 4 for Windows.

PUT THE POWER OF 1-2-3 INTO WORDS

You can upgrade from your current word processor to Ami Pro for just $129.* Or you can get the whole family by upgrading to the award-winning Lotus SmartSuite.® It brings together Ami Pro, 1-2-3 Release 4, Freelance Graphics,® Approach® database and Lotus Organizer™ personal information manager, for just $299.**

Call **1-800-TRADE UP, ext. 9397**† for working model or visit your Lotus Authorized Reseller

Lotus
Working Together®

current word processor ready when you call. **$299 direct from Lotus. Offer expires 1/31/94 or while supplies last. Call **1-800-TRADE-UP** to see
All rights reserved. Lotus, SmartSuite, SmartIcons, Ami Pro, 1-2-3, Freelance Graphics, Approach and Working Together are registered trademarks
Windows is a trademark of Microsoft Corporation.

CIRCLE 143 ON READER SERVICE CARD

RUNNING WINDOWS WITHOUT NORTON DESKTOP? YOU PROBABLY SWIM AFTER A BIG MEAL AND THEN RUN AROUND THE POOL WITH SCISSORS, TOO.

Listen up, you risk-takers. What would your mother say if she saw you now?

No doubt she would tell you to go right out and get the new Norton Desktop 3.0 for Windows before you damage yourself. Or your computer.

That's because NDW 3.0 not only enhances your work, it's also the safest way to run Windows short of tapping directly into Bill Gates' subconscious. Made by Peter Norton, it's packed full of utilities to provide a safer working environment.

Like our new Norton AntiVirus 3.0, which protects your system against over 2,300 known viruses, and our new Norton BackUp™ 3.0 with enhanced support for SCSI drives. There's also the new UnErase, to recover accidentally erased files. Disk Doctor for automatic disk diagnosis and disk repair. And a Fix-It disk with a full collection of DOS utilities to recover and repair files or entire disks, even if you can't run Windows. And now for the first time, you'll be able to run Speed Disk under Windows to boost performance.

In addition, NDW 3.0 simplifies Windows for you by integrating file and program management. And while the new FileAssist will allow you to easily manage your files without having to leave your applications, the new Day Planner will allow you to easily manage your life. And who doesn't need a little help with that?

Plus, the new "push button" Control Center allows you to customize pull-down menus, icons, toolbars and a lot more to make sure that Windows looks and works exactly the way you want it to.

So the choice is yours. Either see your local dealer, call 1-800-628-4777, ext. 9112 to order, or live a life full of danger and recklessness, running Windows without Norton Desktop 3.0 for Windows and sprinting around pools with sharp objects until you finally put somebody's eye out.

Of course, you would be absolutely crazy not to pick up your own copy of NDW 3.0 today. And remember, don't run Windows without it!

THE NORTON DESKTOP FOR WINDOWS™

SYMANTEC.

For information in Europe, call 31-71-353111. Australia, 61-2-879-6577 Canada, 1-800-667-8661. Elsewhere outside U.S., 408-252-3570. The Norton AntiVirus and Norton Disk Doctor are registered trademarks and Norton BackUp, Norton Desktop and Speed Disk are trademarks of Symantec Corporation. ©1994 Symantec Corporation. All rights reserved.

CIRCLE 117 ON READER SERVICE CARD.

Infrared Tower of Babel

Setting a wireless standard.

With all the attention that wireless communication is getting these days, there's one wireless technology that's inexpensive, safe, unregulated, and lost in the spectrum of invisible light: infrared. One reason infrared is sometimes ignored is because hardware manufacturers use different protocols to transmit signals. The result is a virtual Tower of Babel, where desktops, notebooks, PDAs, and printers speak their own invisible languages. That could change this year as many developers agree on ground rules for point-and-shoot infrared communication.

"A Zoomer can talk only to another Zoomer. An Omnibook can't approach a Sharp Wizard," explains John LaRoche, of the Infrared Data Association, which is promoting a universal infrared serial link that connects desktop PCs, printers, telephones, docking stations, networks, and PDAs. "A standard will allow for true interoperability between PDAs, mobile communicators, and peripherals so you won't have to worry about brand names."

Fifty member companies are working on standards that address details such as the way the pulses are encoded and the wavelength of the infrared light so that both ends agree on how to interpret the stream of light. The two protocols in the spotlight are Hewlett-Packard's Serial Infrared communications interface (SIR), found in HP's OmniBook, and General Magic's MagicBeam, found in Apple's Newton and Sharp's Wizard. SIR uses pulses of light to transmit data at a rate of 115.2 kilobits per second over distances of 1 to 3 meters. Magic Beam, which modulates a beam of light, can use less power to transmit less data over a longer distance—38.4 Kbps and 4 meters, respectively. "Magic Beam is more like an FM receiver. You can modulate for different channels so you can have multiple communciations going on in one area," explains General Magic's Tony Fadell. Dual-mode hardware would support both standards, similar to having AM and FM on one radio.

Cross-brand interoperability is a tall order. Some say that expectations are too high and that a standard may emerge only when a substantial volume of products hits the market. When that happens, you'll be able to shoot files to printers, transmit pages to fax machines, and use infrared docking stations instead of tangled cords to synchronize desktop PCs with mobile companions.

—Carol Levin

Illustration by Troy Thomas

FireWire: It's Serial

THE PC'S SERIAL PORT IS ITS SLOWest interface, but a new serial interface may bring the old port up to speed. Texas Instruments and Apple are behind a new serial bus interconnect specification, which they see as a replacement for the external ports on a computer. The new port is called the P1394 specification by TI, but Apple, always on the lookout for a catchy name, dubbed it the FireWire.

The P1394/FireWire can transfer data at 12.5 megabytes per second and has many advantages over existing serial ports. Mike Salas, project manager at TI for the P1394, sees it as the universal I/O port. "Our vision is to eliminate all the different external ports, like IDE, SCSI, parallel, and serial, on both desktops and notebooks. You can use the P1394 to connect hard disks, printers, digital cameras, or scanners to a single port." Salas says the P1394 will help usher in the acceptance of multimedia components. "The P1394's bandwidth can provide isochronus services that will let multiple devices use the same port."

For now, the P1394 is only a specification that is up for ratification by the Institute of Electrical and Electronics Engineers (IEEE) standards committee. While no company has yet announced plans to incorporate the new port, all the major computer vendors, including IBM and Digital, are on the design committee. Of course, a port is useless without something to attach, so a number of peripheral makers have also endorsed the idea. Some of the manufacturers that have expressed support include disk drive makers Adaptec, Maxtor, and Western Digital.

If the P1394 is to become a usable standard in the PC marketplace, it will have to address future standards such as the Plug and Play specification that is being promoted by Microsoft, both the VL-Bus and PCI local-bus standards, and PCMCIA. When asked how the P1394 specification would work with those buses, Salas replied, "We're evaluating how the P1394 will work with them and will address those issues in the next version of the specification."

—Christopher Barr

Pipeline *By Robin Raskin*

Starstruck Games

Computer software makers have stars in their eyes as they grope for Hollywood techniques and Hollywood friends to pump up the entertainment value. If these computer games are going to succeed, their developers need to get past the "let's do like they do in the movies" stage.

Take a look back at early films and you'll see that they imitated the theater—lots of "straight ahead" camera shots focused on "stage-like" action. Today we see mattes, dissolves, fades, and other cinematic techniques finding their way onto computers. Two good examples are Critical Path from Media Vision and TuneLand from Seventh Level.

Media Vision, best known for its multimedia hardware, began its software division last spring. Min Yee, last seen as publisher of Microsoft Press and VP of Microsoft multimedia, and Stan Cronyn, the founder of Warner New Media, head the operation (see the possibilities?). New Media relies on third-party vendors to create original titles.

Critical Path (created by Mechadeus) is an action adventure game that stars a young female helicopter pilot named Kat. Kat is a real live actress, as are most of the thugs and the dictator (played by Yee himself) that she encounters. As the real actors are set into background scenery with masks and blue screens, you almost get a true movielike visceral response. When you see Kat falling off a building, it's in the style of Superman and Batman, not PacMan. Quantum Leap, New Media's science-fiction game (created by Hyperbole), breaks new ground by letting characters appear in multilayered "spots" so you get the feeling of a point of view—a technique dubbed VirtualCinema.

Seventh Level's Tuneland has the backing of a cast of Hollywooders and would be-ers. George Grayson, formerly of Micrographx, and ex-Pink Floyder Scott Page lead a group that includes Merv Adelson of Lorimar and Michael Milken of junk-bond fame. Tuneland is kid's software that aspires to gain an identity that lives beyond software—on cereal boxes, in movies, and in fashion. (Thus far only Carmen Sandiego can claim success in this area.) Tuneland is a cartoon songfest with all your favorite kiddie tunes (the music's not bad) and it stars a series of whimsical characters. The protoganist is a bear with Howie Mandel doing the voice. The animation is very rich and Disney-esque. Seventh Level relies on traditional animation techniques to make the characters and their voices incredibly fluid.

These are only two examples of "touched by the stars" software. Rock stars Peter Gabriel and David Bowie are turning out their own CD-ROMs (not in PC format just yet), and Viacom just released Dracula Unleashed, an original-content CD with plenty of Hollywood effects. While they're all good, they don't have the plot of even a B-grade movie. Broderbund's new Myst, available only on the Macintosh, and some early work out of Xiphias (it's working on "matrices" of action) are headed in the right direction. Maybe we need to get the stars out of our eyes and develop a style that is uniquely for PCs.

For my next column, I'll look into the dark side of all the fun and games—system resources.

Robin Raskin is editor of PC Magazine.

Cable PCs

HOPING TO LEVERAGE THE 60 MILlion cable-subscribing households across the country, on-line services have started to field-test prototype cable modems. And they're hoping to find out what consumers really want on-line.

Speed is the main advantage of a cable modem over a conventional modem that dials in over the phone line. By connecting directly to an on-line service over broadband cable, subscribers will get almost instantaneous communication without tying up the phone line. Zenith claims that its HomeWorks modem runs at 500 kilobits per second, over 200 times as fast as a 2,400-bps modem and over 50 times as fast as a 9,600-bps modem.

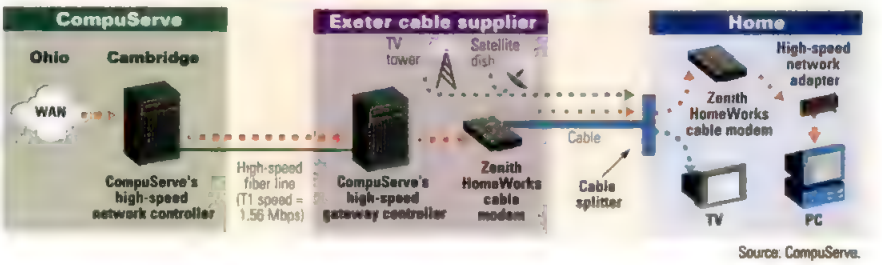
Prodigy and Cox Cable are testing the HomeWorks modem in San Diego and El Cahjon, California; CompuServe and Continental Cablevision are testing it in Exeter, New Hampshire. And early this year, America Online is slated to test a cable modem from Intel and General Instrument.

With the HomeWorks cable modem, you'll be able to use your PC to "tune in" to your favorite on-line services. It comes with a network adapter card and connects your PC to your local cable provider. You need a $5 cable splitter from Radio Shack in order to share the cable between your PC and TV. The typical 65-channel cable system today provides a bandwidth of 450 MHz, with each video channel using 6 MHz. HomeWorks provides four data channels in one standard 6-MHz channel.

Prodigy subscribers with the modem can instantaneously browse merchandise (JPEG-compressed photos) without waiting to download them. As for further enhancements to Prodigy's services, "It all depends on what consumers want," says Prodigy's Debra Brochert. "What we hope to learn is how customers' preferences will be affected by photographs," she says.

All three services have yet to work out logistics, such as whether you would rent modems from cable companies or buy them (at close to $500, the current price is steep); and whether you would subscribe to a service as you would to a movie channel. "It's important to find out where the bottlenecks are and how well the modems work," says CIS' Doug Martin. "We want to demonstrate to people that this is technology available today, but we also need to find out what people want."—*Brendon Macaraeg*

Cable PC Plumbing



Source: CompuServe.

Top Retail Software

Current ranking	Last issue	Product/ company
1	1	**MS-DOS 6.2 Upgrade** *Microsoft Corp.*
2	10	**TurboTax for Windows HeadStart** *ChipSoft Inc.*
3	6	**Quattro Pro 5.0 for Windows** *Borland International*
4	—	**MS Windows for Workgroups 3.11** *Microsoft Corp.*
5	2	**Quicken 3 for Windows** *Intuit*
6	7	**MS Works 3.0 for Windows** *Microsoft Corp.*
7	—	**Expert Fonts 1.0** *Expert Software*
8	4	**MS Office 4.0 for Windows Upgrade** *Microsoft Corp.*
9	—	**Quattro Pro 5.0 for DOS** *Borland International*
10	5	**MS Windows 3.1** *Microsoft Corp.*
11	—	**OS/2 for Windows** *IBM Personal Software Products*
12	—	**Lotus 1-2-3, Release 4.01 for Windows Upgrade** *Lotus Development Corp.*
13	12	**TurboTax for DOS HeadStart** *ChipSoft Inc.*
14	3	**Quicken 7 for DOS** *Intuit*
15	8	**WordPerfect 6.0 for DOS** *WordPerfect Corp.*

This list ranks PC business programs according to the total number of copies shipped to stores and resellers in the week ending January 1, 1994. The list is based on shipments to more than 12,000 retail locations. It does not include sales made directly by software publishers and cannot be interpreted as a picture of the entire software market. Sales information adapted from a compilation by Ingram Micro.

Reassessing Digital Property

AS THE TRAFFIC AND PROFIT IN ON-line services rise, publishers and authors who ignored the technology in its early stages are now testing the boundaries of intellectual property law.

Music publishers recently filed a class-action lawsuit against CompuServe alleging that it distributes copyrighted songs without getting permission from or paying royalties to them. The controversy is not over whether the music publishers should be paid, it's who should pay them. CompuServe points to the forum managers, and the managers point to the users who upload songs without the managers' knowledge. The publishers say it's too hard to go after individual music pirates, and they want CompuServe to provide one-stop reimbursement.

In another case, the National Writers Union announced a lawsuit pitting ten writers against several major publishers. The central issue is whether they must pay authors separately for electronic publication.

Not all the legal hassles are on-line. Compton's New Media announced a patent at the fall Comdex trade show that some say would give it the keys to the emerging multimedia industry. The patent covers basic technology in constructing and searching multimedia databases. In a very rare move, the U.S. Patent and Trademark Office announced that the Compton's patent would be re-examined at assistant commissioner Bruce Lehman's request. Lehman acknowledged that the patent "has prompted a strong and concerned reaction in a particularly dynamic and changeable industry."

The furor over software patents has been growing steadily ever since the first software patent was upheld by the U.S. Supreme Court in 1981. While thousands of patents for inventions that include software are now issued every year, few have been tested in court. The lack of judicial feedback may be resulting in patents that are too broad or invalid. It takes time and money to challenge a patent, and it's often cheaper to buy a license than to fight it out. The cost of licensing or "inventing around" these patents is typically passed on to the consumer. And, says Philip Dodds, executive director of the Interactive Multimedia Association, "these patents threaten to hurt industry growth" and "produce a chilling effect that scares off new and small developers."

The patent office is taking notice of the industry's unease and is conducting public hearings. In the spirit of on-line interactivity, you can submit comments to the patent office via Internet electronic mail to: comments-software@uspto.gov.

It isn't likely that all these issues will be settled anytime soon. The only certainties will be more vigilant royalty collection and large legal fees.—*Steve Barber*

Brighter LCDs With Light Pipes

NOTEBOOK MANUFACTURERS are experimenting with a number of power-saving screen options to reduce the juice drained by the backlight and are achieving different degrees of success. Toshiba's Portege subnotebook introduced a 1.4-watt color active-matrix LCD panel that uses a single backlight bulb (most panels use at least two). And Hewlett-Packard chose to eliminate the backlight in its OmniBook totally by using a reflective panel that's hard to read in low light.

But there's light at the end of the tunnel. The Flat Collimator light pipe, created by BriteView Technologies of Santa Clara, California, promises to brighten an LCD screen by better focusing the light that passes through it without using more power. A collimator is an optical system that transmits parallel rays of light. BriteView Technologies' Flat Collimator uses a ray-gun effect to send all the light from an LCD's backlight directly to the viewer. Another advantage is an improved contrast ratio. A conventional backlight sends "stray" light toward the viewer so the display is often "smoky." A Flat Collimator display is clearer because less light travels at off-axis angles.

Light pipes aren't new. LCD panels use a light pipe to direct light from the fluorescent tube backlight through layers of liquid crystals, filters, and polarizers. "Ordinary light pipes scatter the light randomly, while the Flat Collimator distributes the light directly to the LCD. Energy is conserved and the result is a backlight that uses half the power to achieve the same brightness," says Han Zou, an optical-electro scientist at BriteView.

BriteView Technologies' Flat Collimator (left) focuses light forward so the LCD panel is brighter, has an improved contrast ratio, and uses less power. Conventional backlights (right) scatter the light.

Source: BrightView Technologies

The Flat Collimator will work with any conventional backlit or sidelit color LCD panel, without modification and without significant cost. According to Zou, "All the major LCD manufacturers have shown interest in using the Flat Collimator, and the first panels to use it should be available in a few months."—*Christopher Barr*

Interface Pioneers March Forward

WHAT HAPPENS WHEN YOU THROW interface conventions out the window? An interdisciplinary group of researchers and students at the University of Maryland's Human-Computer Interaction Laboratory (HCIL) is pioneering the latest ideas in interface design. It's one of the leading labs involved in this research, along with Carnegie Mellon University and MIT's Media Lab.

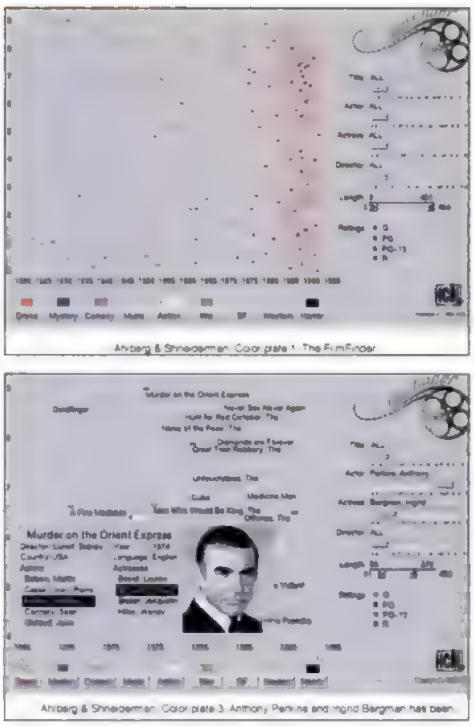
By considering the psychological component of what people like—and hate—about working with computers, the scientists have developed innovative technologies that software companies are exploring for future database products and cable companies are considering for video-on-demand services.

"A pixel is a terrible thing to waste," says lab director Ben Shneiderman. His research has shown that users find it easier to locate items in huge or complex databases if they're presented with an overview and given the ability to "drill down" to view details. Visual representation of data is the only practical way to do this. Today's systems, he says, don't provide good tools for navigating through huge or complex data sets.

Inside this interface incubator, students from as far away as Finland and India are refining ways to make threatening technology more approachable.

But the lab isn't full of futuristic prototypes of voice recognition systems and talking computers. Instead, most of the systems they're designing for are machines like most people have on their desks today. "We're building things that work on real machines for real people," says Shneiderman.

Their overriding philosophy is based on our tremendous visual sense and our ability to visually spot correlations, exceptions, and trends. To prove the point, the lab has developed prototype applications that may one day help you find the movie you want in a video store, locate your dream home, choose a college, or even manage a vast network. Without entering arcane commands (you use a mouse or a touch screen), you can explore and find patterns, exceptions, and correlations that you wouldn't discover otherwise.



FilmFinder displays every data point; in this case, all films made since 1920. Dynamic slider bars narrow the search by criteria such as actor and director, and the interface continuously updates results in a visual starfield display.

One database search technique to come out of HCIL is the *dynamic query,* first demonstrated with an application called HomeFinder. Homes are represented as points on a map, and innovative slider bars let you filter which homes are shown—say, three bedroom homes within five miles of work. The map is then rapidly refreshed. While SQL databases can take several seconds to respond to a query, this method can process 10 to 100 queries per second because the interface *is* the database.

Another application based on dynamic queries is FilmFinder. This database, similar to Microsoft's Cinemania, lets you view the database as a whole then refine your search by using innovative slider bars for criteria such as rating, length, director, or actor (see illustration).

Another technique HCIL has been exploring is called *treemaps,* which are a cross between stacked bar charts and Venn diagrams—nested rectangles—and are useful for displaying hierarchical and categorical data. An engineer at NEC has built an application that uses treemaps to analyze business decisions such as selecting a building site. The top-level factors (social, economic, technical) are entered first, and then the components of these top-level factors are entered. The importance of each factor is reflected in the size of its rectangle. The program determines the "winner" by summing the probabilities and displays a bar chart of the results.

The challenge for this research team is to optimize algorithms within memory and processing constraints so that dynamic queries and treemaps can work as fast as our eyes can browse. When that happens, than a picture really will be worth a thousand queries.—*Carol Levin and Sheryl Canter*

Briefs

WALL STREET PREDICTS RISC FUTURE. Investment research firm Sanford C. Bernstein reports the following trend: "Over the next two years, cross-platform software tools will facilitate coexistence and integration of different platforms within a corporate environment. RISC microprocessor market penetration should grow to 24 percent of the total unit sales by 1997, with roughly 50 percent of volume driven by PowerPC. Intel's x86 market share is projected to decline from 84 percent in 1993 to roughly 75 percent in 1997."

BUSINESS CATERS TO SOFTWARE buyers. Boston-based Bright Ideas (617-235-3620) is capitalizing on the dizzying selection of kids software by deploying consultants to run software seminars and demonstrations for parents at day-care centers, PTA meetings, and corporate events. Microsoft throws Tupperware-inspired Family Technology Nights to promote its Microsoft Home line of software. And at computer kiosks in New York bookstores Shakespeare & Company and Barnes & Noble, you can preview electronic books from The Voyager Company.

THE EDUCATIONAL TESTING SERVICE IS phasing out the "Number 2 Pencil" routine you may recall—perhaps with a pang of anxiety. By the 1996-97 testing year, the ETS expects toadminister the Graduate Record Exam on PCs. Tests can be given more frequently and conveniently and will be scored while you wait. —*Carol Levin*

The ZEOS® Ambra™: There's No Other System Like It!

AFFORDABLE, UPGRADABLE AND COMPLETELY COMPATIBLE

ZEOS Ambra computers are not just another line of systems. They're the ultimate node or ideal home office computer. Why ultimate and ideal? What's new? On-board local bus video, larger system cache, larger hard drives and the option of a 486SX or 486DX microprocessor. What's more, our incredible new lower prices make ZEOS Ambra systems more affordable than ever!

To give you the best value, we offer money-saving packages that include quality ZEOS components and choice extras. Standard are an upgradable Intel CPU, 128K SRAM cache for faster data access, and enough bays to add a CD-ROM, 5.25" floppy and tape backup. Plus, five expansion slots including two VESA local bus. All this in a space-saving slim case. Of course, we'll also custom-build a system to your exact needs–choose from many affordable options including modems, networking cards and more.

And, the Ambra is ideal for networking. It's 100% compatible with every major network operating system on the market. Getting connected is a breeze!

It's the little powerhouse that's also great for word processing or intense spreadsheets. Whether it's plugged into your network or plugging away at the home office, ZEOS Ambra computers are the sensible systems that won't cramp your style or take a bite out of your wallet. Call your Systems Consultant at 800-554-7172.

AWARD-WINNING SERVICE & SUPPORT

Many companies talk about service, but at ZEOS, our customers do the talking. ZEOS has won more *PC Magazine* Readers' Choice for Service & Reliability awards than any other company– five in all!

We're here for you 24 hours a day, 365 days a year, and always a toll-free call away. ZEOS systems come with a One Year Limited Warranty, Express Parts Replacement and a 30-Day Money-Back Guarantee. Call 800-554-7172 today.

STANDARD WITH EVERY ZEOS AMBRA SYSTEM:	PACKAGE 1	PACKAGE 2
■ 486SX or 486DX Intel microprocessor. ■ Intel's Pentium™ OverDrive™ upgrade socket. ■ 128K SRAM cache. ■ Two serial ports, one parallel port and one mouse port integrated on the motherboard. ■ Five expansion slots: two VESA local and three 16-bit ISA. ■ Small footprint case with four bays. ■ System speed is selectable through the keyboard. ■ 200 watt power supply, switchable between 115/230V. ■ ZEOS 101-key space-saving keyboard. ■ Password feature built-in ROM for security. ■ FCC Certified Class B; UL Listed. ■ Complete ZEOS Customer Satisfaction Package.	**486SX-25** ..... **$1195** Lease $50/month **486SX-33** ..... **$1295** Lease $55/month **486DX-33** ..... **$1395** Lease $59/month ■ 4MB RAM ■ 214MB IDE hard drive with built-in 128K cache ■ 3.5" 1.44MB floppy drive ■ On-board VESA local bus SVGA color video ■ ZEOS 14" 1024 x 768 SVGA color monitor, .28mm dot pitch ■ Two-button mouse ■ Microsoft DOS 6.2 with Enhanced Tools ■ Windows for Workgroups 3.11	**486SX-25** ..... **$1495** Lease $63/month **486SX-33** ..... **$1595** Lease $58/month **486DX-33** ..... **$1695** Lease $61/month ■ 8MB RAM ■ 340MB IDE hard drive with built-in 128K cache ■ 3.5" 1.44MB floppy drive ■ On-board VESA local bus SVGA color video ■ ZEOS 14" 1024 x 768 SVGA color monitor, .28mm dot pitch ■ Two-button mouse ■ Microsoft DOS 6.2 with Enhanced Tools ■ Windows for Workgroups 3.11

Fax Orders: 612-633-1325, Government: 800-245-2449, Hearing Impaired (TDD): 800-228-5389, Outside U.S. and Canada: 612-633-6131. Purchase Orders, MasterCard, VISA, Am Ex, Discover, Z-Card,™ COD and affordable leasing programs. Open 24 Hours a Day, 365 Days a Year!

CALL NOW TOLL FREE

800-554-7172

ZEOS INTERNATIONAL, LTD.

Purchase orders are subject to approval. Business leasing programs available. Lease prices based on a 36-month lease, $1 purchase option. All prices, specifications and availability are subject to change without notice. ©1994 ZEOS International Ltd. ZEOS is a registered trademark of ZEOS International Ltd. Intel and Pentium are registered trademarks and OverDrive is a trademark of Intel Corporation. Z-Card is a registered trademark of ZEOS International Ltd. All other trademarks and registered trademarks are the property of their respective holders.

CIRCLE 038 ON READER SERVICE CARD

DX17F
GREEN ENERGY
MONITOR
DX15F
GREEN ENERGY
MONITOR

It's a Jungle Out There!

AND MAG INNOVISION WANTS TO KEEP IT THAT WAY. IT'S WHY WE'RE INTRODUCING GREEN ENERGY.

GREEN ENERGY WAS DEVELOPED TO HAVE MINIMAL IMPACT ON THE ENVIRONMENT. GREEN ENERGY MEANS EPA ENERGY STAR COMPLIANCY. GREEN ENERGY MEANS VESA DISPLAY POWER MANAGEMENT SIGNALING COMPATIBILITY. GREEN ENERGY MEANS CONFORMANCE WITH SWEDAC MPR II LOW-EMISSION STANDARDS. AND GREEN ENERGY MEANS NO OZONE DEPLETING SUBSTANCES WERE USED IN MANUFACTURING OR PACKAGING.

BEST OF ALL, MONITORS WITH THE GREEN ENERGY LOGO FROM MAG INNOVISION WILL HAVE THE LEGENDARY PERFORMANCE AND QUALITY OF A MAG THAT EARNED US PC MAGAZINE'S EDITORS' CHOICE FOR 4 CONSECUTIVE YEARS, AND READERS' CHOICE IN SERVICE AND RELIABILITY THIS YEAR. THE KIND OF PERFORMANCE AND QUALITY YOU'D EXPECT FROM TOP SYSTEMS AND FUTURE GREEN SYSTEMS.

CALL US AT 1-800-827-3998 (1-714-751-2008 IN CALIFORNIA) AND WE'LL SEND YOU INFORMATION ABOUT MAG INNOVISION'S NEW GREEN ENERGY MONITORS, HOW THEY HELP SAVE THE ENVIRONMENT AND WHERE YOU CAN GET ONE.

IT'S A JUNGLE OUT THERE! LET'S KEEP IT THAT WAY.

MAG INNOVISION

GREEN ENERGY

MAG INNOVISION

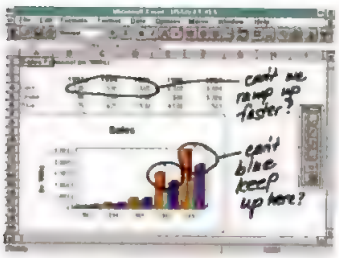
©1994, MAG INNOVISION, INC. ALL RIGHTS RESERVED. MAG INNOVISION AND ITS LOGO ARE TRADEMARKS OF MAG INNOVISION, INC. ALL BRAND AND PRODUCT NAMES ARE TRADEMARKS OR REGISTERED TRADEMARKS OF THEIR RESPECTIVE OWNERS.

CIRCLE 067 ON READER SERVICE CARD

Add Pen Computing To Your Desktop For Only ~~$399~~ $199*

Handwriter For Windows: What You've Always Wanted

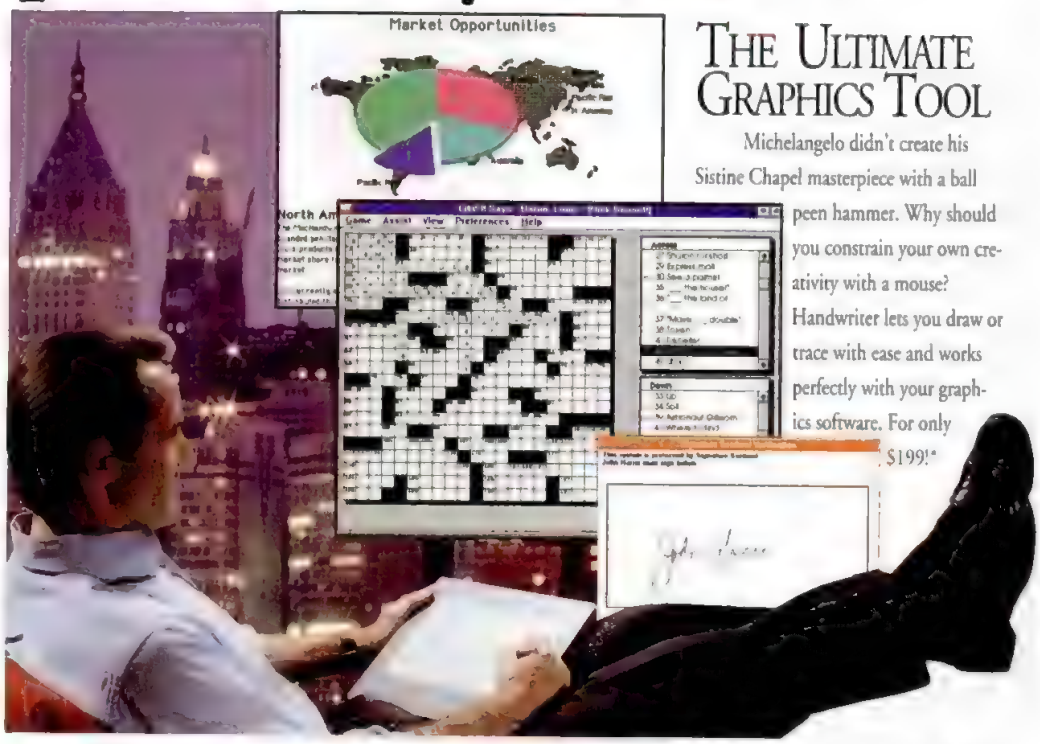
It's here: maximum synergy between your brain and your PC. We're proud to introduce Handwriter® for Windows, the all-in-one input device for entering graphics, text and commands. Point, write and draw as simply as with pen and paper. It's 100% compatible with your Windows applications and simple to install.



Shown above is handwritten annotation to a spreadsheet. Each member of a workgroup makes their annotations in uniquely colored ink. A pen is such a perfect complement to your keyboard, you'll probably never use a mouse again — in your whole life.

Ultimate Security: Your Signature

Why try to remember all those different passwords — and changing them periodically — when Handwriter comes with signature-verification security built into a screen saver? People may *try* to trace your signature, but it's virtually impossible for them to duplicate the stroke dynamics you used to write it. Signature security alone is reason enough for most MIS departments to complement all keyboards with Handwriter for Windows.



The Ultimate Graphics Tool

Michelangelo didn't create his Sistine Chapel masterpiece with a ball peen hammer. Why should you constrain your own creativity with a mouse? Handwriter lets you draw or trace with ease and works perfectly with your graphics software. For only $199!*

Get The Recognition You Deserve

Companies Offering CIC Recognition Technology:	
Apple/Japan	NCR/AT&T
Arthur Dent	NEC
Dauphin	Samsung
Fujitsu	Seiko Epson
IBM	Toshiba
MicroSlate	and others

The reliability and speed of our recognition is so surprising, it's no wonder everybody who's anybody is adopting our advanced Handwriter Recognition System® in *their* announced or soon-to-be-announced pen computer products.

The Ultimate Editing Tool

Sure, you type very fast. But you spend at least 80% of your document-creation time editing. Imagine highlighting, moving text, changing words here and there, spellchecking, pointing and clicking — all from one device, all while leaning back in your most comfortable, creative position! This is why pen computing has been so interesting to so many people for so long. It's the *natural* way to interface with your computer. And it doesn't hurt.

The Ultimate Physical Therapist

Are you tired of hurting, of sitting for extended periods in a rigid, cramped position? Are you really getting paid enough to suffer? 56% of all OSHA reported injuries are RSI, or Repetitive Stress Injuries. Would you care to guess the recommended physical therapy for hand and tendon problems? It's flexing your fingers, making a fist. Kind of like you'd do around a pen. Handwriter for Windows is a very healthy complement to your computer's keyboard.

Handwriter for Windows™ Includes:

Handwriter Recognition System software, Microsoft Pen Extensions for Windows, a screen saver with Signature Verification, Crossword puzzles and a way to get more, ultra-thin/ultra-light tablet that plugs into your serial port, and a cordless electronic pen.

Satisfaction Or Your Money Back, So Order Today!

Limited Time Offer ***$199** Until 2/28 1994

Handwriter® for Windows™

THE CREATIVITY TOOL

Call 800-888-9242 ext 5021

415-802-7888 from outside the U.S.

Or FAX 415-802-7777

Communication Intelligence Corporation
CIC. A NASDAQ N. M. listed company

©1994 by CIC. Handwriter and Handwriter Recognition System are trademarks of Communication Intelligence Corporation. All other trademarks acknowledged. *The $199 (US) offer is valid only in the U.S. and Canada. Return privilege is 30 days provided the product is in resalable condition. For pricing information outside the U.S. and Canada, call 415-802-7888.

TRBA

First Looks

HANDS-ON REVIEWS OF NEW SHIPPING PRODUCTS

The Latest from NEC, TI, and Toshiba

New 50-MHz Notebooks Dazzle with Color and Speed

If you're willing to tote a couple of extra pounds, you'll find these 486-based color notebooks fully loaded, comfortable to use, and easy on the eyes.

NEC Versa Has TouchPen Option

BY DON WILLMOTT

NEC Technologies has pumped up just about all the components in its Versa systems to keep these versatile notebooks on the cutting edge. The biggest news is that the new E Series features an optional PenTouch screen.

We looked at the NEC Versa 50EC, a 50-MHz 486DX2-based system with 4MB of RAM, a 340MB hard disk (there are user-upgradable hard disk options from 120MB to 340MB), PCMCIA compatibility for one Type III or two Type II cards, and a dazzling 9.5-inch active-matrix color display that's brighter than the one it replaces but doesn't use any more power. The system we tested is priced at a lofty $5,529.

Measuring 2.1 by 11.7 by 9.3 inches (HWD), the Versa is roughly the same size as other notebooks with similar features, and its 6.9-pound weight is acceptable, given the configuration. Fortunately, NEC has shrunk the size of the AC adapter by 50 percent.

BRIGHTER: *NEC improves its color display.*

There's also an interesting new trackball design, which NEC has dubbed VersaTrack. A small ball is positioned on the front edge of the notebook, with a square button on each side. It takes some getting used to, but the design does lend itself to easier drag-and-drop maneuvering once you get the hang of using two hands to do it.

In testing, the NEC Versa 50EC did best in the video categories. With its local-bus technology and BitBlt (bit-block transfer) accelerator, it scored quite high on the PC Bench video test and yielded a good Graphics WinMark score of 3.69. Its battery lasted 2 hours 51 minutes—not bad considering the unit's excellent color display. Processor and disk results were far less inspiring.

Ordering a PenTouch touch screen adds $500 to the price of the system. The technology, from MicroTouch Systems,

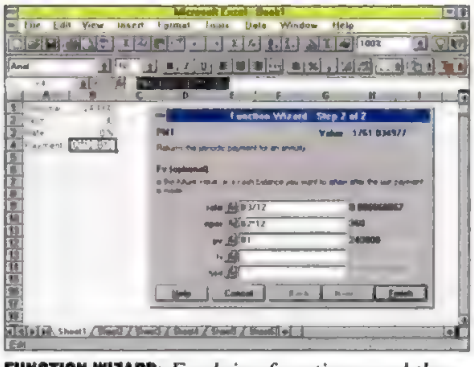
Continues on page 38

An In-Depth Look

Excel 5.0 Extends Both Features and Usability

BY CRAIG STINSON

The latest revision of Microsoft Excel includes brilliant ease-of-use enhancements and new features to augment the program's analytic power. Among other things, the $495 Excel 5.0 introduces groundbreaking innovations in the area of on-sheet list and database manipulation, Wizards to help with formula building and short cuts, and even a Wizard for creating "pivot tables"—transposable crosstab reports that mimic the most appealing characteristics of Lotus Improv. But this time, along with the new features come four major structural changes.



FUNCTION WIZARD: *Explains functions and the purpose of required and optional arguments.*

First, to underscore Excel's role as a member of the Office product family, Microsoft has made the very smart move of redesigning the program's user interface to make it consistent with Word for Windows 6.0. The menu and standard toolbars of the two programs are now nearly identical, and both programs have adopted a common "tabbed" style of dialog box. Like Word, Excel 5.0 can attach summary information to files, including title, subject, author, and keyword. An identical file-find utility serves both programs, the spell-checker is shared, both support OLE 2, and you drag-and-drop to transfer data.

Continues on page 39

IN FIRST LOOKS

Micrografx Charisma 4.0...40
Handwriter for Windows...42
Canon IX-4015 scanner.....44
LapLink Wireless 1.0.....46
Corel CD PowerPak.....48
IdeaFisher for Windows 5.0.....48
Nanao FlexScan F780iW ...49
Leadview 3.0 for Windows..50
Columbia Dictionary of Quotations Mondial 1.0.....52
MorphWizard 1.0.....54
SpinRite 3.1.....54
QmodemPro 1.0 for Windows 56
CardGrabber 1.0 56

Color Notebooks

CONTINUED FROM PAGE 38

worked well on the prototype we evaluated. Not only can you use any type of pen to write or to move the cursor, you can even play Solitaire on-screen using your finger as a pointing device. NEC includes an assortment of pen-based programs. If you want to try out pen computing but don't want to buy into the more hardcore pen approach of Compaq's Concerto, this is a good way to get started.

With the improved active-matrix color screen, PCMCIA Type III compatibility, and touch-screen option, NEC has equipped the Versa 50EC to be as customizable as possible.

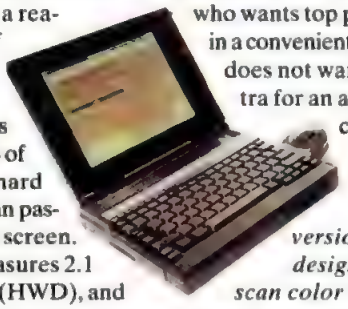
• List price: *NEC Versa 50EC, with 4MB RAM, 340MB hard disk, $5,529. NEC Technologies Inc., 1414 Massachusetts Ave., Boxborough, MA 01719; 800-632-8377; 508-632-4636.*

Circle 433 on reader service card

New TI Has Dual-Scan Display

BY BRUCE BROWN

The most recent version of a proven design, Texas Instrument's TI TravelMate 4000E WinDX2/50 Dual Scan Color, combines a high-quality color screen, aggressive 50-MHz system performance, and excellent battery life, all for a reasonable list price of $3,899.



NEW COLOR: *TI's latest version of a solid design uses dual-scan color technology.*

The TravelMate 4000E is equipped with 4MB of RAM, a 200MB hard disk, and a dual-scan passive-matrix color screen. The notebook measures 2.1 by 11 by 8.5 inches (HWD), and weighs 7.7 pounds including the battery, AC adapter, and Microsoft BallPoint mouse. The TravelMate 4000E has a fine full-travel keyboard with separate cursor and page movement keys, but lacks a PCMCIA slot.

The 9.4-inch dual-scan passive-matrix color screen doesn't have as wide a vision angle as an active-matrix display, nor is it as bright and clear, so it's not a good candidate for small group presentations. Dual-scan technology, however, is a huge improvement over single-scan passive-matrix color screens and represents a wise compromise between price and performance.

In performance testing against notebooks with the same CPU, the TravelMate 4000E excelled in processor-intensive tests. The system did not lead the pack but did well on the disk and Graphics WinMark test suites, lagging only on the PC Bench video test. The Battery Rundown test time of 3 hours 3 minutes was acceptable.

The TI TravelMate 4000E WinDX2/50 Dual Scan Color is a good choice for the power user who wants top performance in a convenient package but does not want to pay extra for an active-matrix color display.

•List price: *TI TravelMate 4000E WinDX2/50 Dual Scan Color, with 4MB RAM, 200MB hard disk, $3899; Texas Instruments, P.O. Box 6102, Temple, TX 76503; 800-527-3500, 512-794-5970; fax, 817-774-6660.*

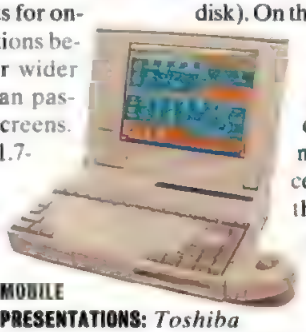
Circle 434 on reader service card

The Toshiba T4700CT: Designed For Portable Presentations

BY TIN ALBANO

Built to be a mobile multimedia system, the Toshiba T4700CT is loaded with everything you'd want in a desktop PC, but at a premium. It lists for $5,299.

The 6.9-pound T4700CT uses a 50-MHz 486DX2 processor and has a 9.5-inch active-matrix color display, a plus for on-the-road presentations because it allows for wider viewing angles than passive-matrix color screens. The unit's 2.2- by 11.7- by 8.3-inch case houses one Type II PCMCIA slot and one 16-mm slot that can hold Type I, II, or III PCMCIA cards.



MOBILE PRESENTATIONS: *Toshiba puts multimedia power in the T4700CT.*

Toshiba integrates both sound and video capabilities into the T4700CT, allowing it to run multimedia presentations. The unit has a built-in microphone and a speaker that supports a more dynamic range of sound than standard internal PC speakers. It also comes with the Microsoft Windows Sound System preinstalled and can deliver 16-bit stereo output.

The T4700CT, which has local-bus video and uses Western Digital Corp.'s RocketCHIP WD24, turned in excellent video performance on our benchmark tests. Indeo 3.0 and Run Time Video for Windows are included with the T4700CT, and take full advantage of the notebook's 32-bit video data path, providing smooth 15-frame-per-second video playback.

The T4700CT we tested had 8MB of RAM (expandable to 24MB) and a 200MB hard disk (there's an optional 320MB hard disk). On the rest of our tests, the unit did well, and its 4-hour Battery Rundown test performance was exceptional, given the unit's active-matrix, power-draining color screen.

The only downside of the T4700CT is its detachable trackball. Toshiba hasn't yet integrated a pointing device into the unit's case. But the LCD provides useful, at-a-glance information and constantly monitors battery life.

Toshiba didn't build the T4700CT for those looking for pocket-size notebooks. It's a full-function portable, with true desktop capabilities.

•List price: *Toshiba T4700CT, with 8MB RAM, 200MB hard disk, $5,299; Toshiba America Information Systems Inc., P.O. Box 19724, Irvine, CA 92713; 800-334-3445, 714-583-3000.*

Circle 435 on reader service card

Benchmark Tests: Color Notebooks

The TI TravelMate 4000E's processor performance surpassed that of the other two 486DX2/50 notebooks we tested, but the NEC Versa 50EC and Toshiba T4700CT, both of which have local-bus video, achieved excellent video performance. Note that the Toshiba's battery life is exceptional, given its active-matrix display.

We used PC Magazine Labs' PC Bench 8.0; WinBench 4.0; Winstone 94, Version 1.0, and Battery test to measure the performance of these three color notebooks

Higher scores represent better performance.	PC Bench 8.0				WinBench 4.0		Winstone 94	Battery
	Processor (score)	Video (score)	Disk (score)	DOSmark (score)	Graphics WinMark (millions of pixels per second)	Disk WinMark (score)	Winstone (score)	Battery (hours:minutes)
NEC Versa 50EC	38.0	3,788	201	238.9	3.2	447	33.3	2:51
TI TravelMate 4000E	34.3	2,277	644	474.1	3.2	600	30.2	3:04
Toshiba T4700CT	27.8	3,259	659	432.3	3.6	565	29.3	4:02

Excel

CONTINUED FROM PAGE 37

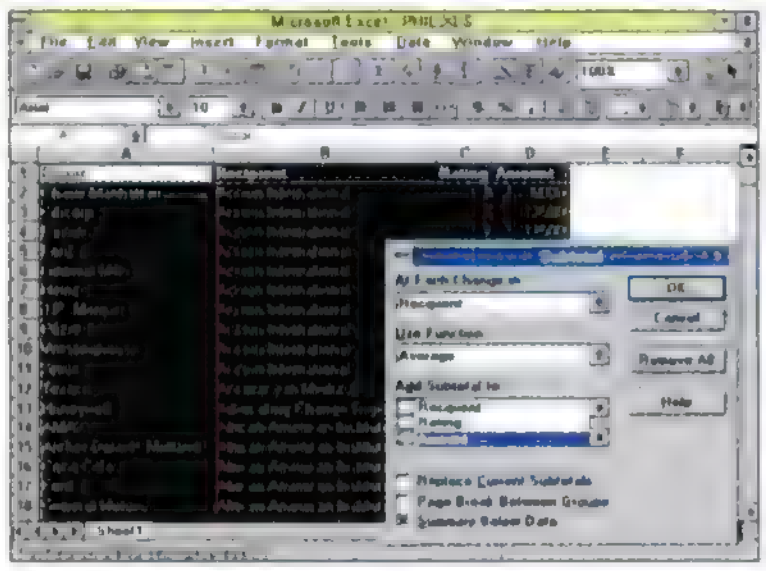
Second, Excel 5.0 offers a new development environment based on Visual Basic for Applications. VBA provides a simpler syntax than Excel's original (XLM) macro language, comes with an easy-to-use dialog editor and menu builder, includes a full set of debugging tools, and can be used to drive other programs that support the "OLE automation" component of OLE 2.

Microsoft says the XLM language will also be supported indefinitely (and each language can call procedures in the other) but will not be expanded to accommodate new features in subsequent revisions. Excel 5.0 also continues to support imported Lotus 1-2-3 macro commands through the vocabulary of 1-2-3, Release 2.01.

Third, the Q+E add-in (from Q+E Software) that was provided with earlier versions has been replaced by a homegrown tool for querying ODBC-compliant external databases. Called Microsoft Query, the product is a subset of Access and will make Office Professional users feel right at home.

Finally, Microsoft has consolidated Excel's .XLC, .XLS, and .XLM file types into a unified document format. All files are now three-dimensional workbooks. By default, a new file consists of 16 blank worksheets, complete with Borland-style nameable tabs to help you navigate and annotate your work. Page names are automatically incorporated into formula references, and the tabs can be used for grouping or rearranging pages. You can even use the tabs to drag pages from one file into another.

Within the new unified format, you can still have a multiplicity of page types. Charts, for example, can either be embedded on the worksheet or installed on separate pages that behave like the .XLC documents of old. This support for multiple subdocuments within an integrated file format makes Excel 5.0 more complex and less ideologically pure than Quattro Pro for Windows or 1-2-3 for Windows, but it should present no problems to the user. If you drop a VBA module into a range of worksheets referenced by a name or formula, for example, Excel just ignores the intervening module page.



SUBTOTALS: *Automatically inserts subtotals based on any standard aggregation function.*

Unlike QPW and 1-2-3/W, Excel's three-dimensionality accommodates page-local as well as global names. Excel simply attaches a page identifier to make a name local. This means you can incorporate a set of completely parallel worksheets into an Excel 5.0 workbook without having to worry about name conflicts. It's a great convenience, particularly for users who are upgrading Excel 4.0 worksheets.

FIRST LOOKS PLUS

From February 21 through 25, you can go on-line to discuss Excel 5.0 with Craig Stinson and Jon DeVaan, Development Manager for Excel 5.0. Type GO EXEC from any CompuServe I prompt.

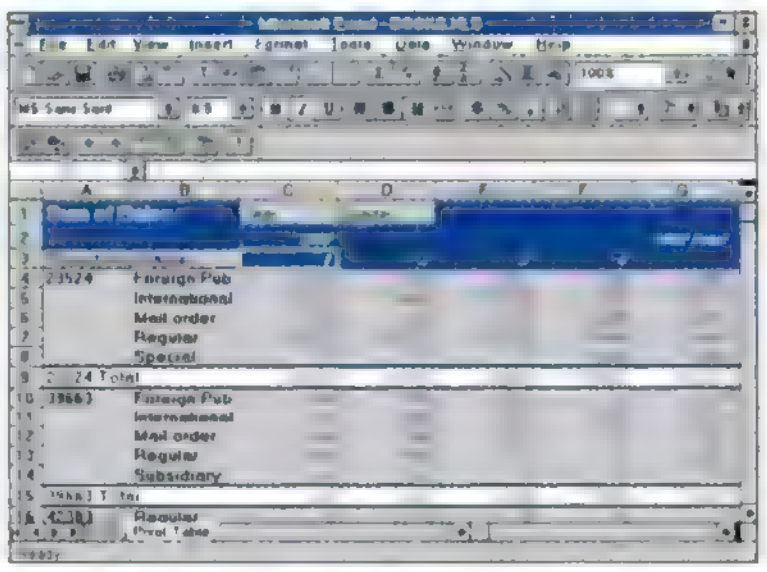
DATABASE MANAGEMENT

On the ease-of-use front, the most important changes in Excel 5.0 lie in the area of list and database management. To find particular records that meet a single criterion, you can select an operator and a value from drop-down lists. Excel shows the qualifying records in place, by filtering the list to exclude the nonqualifiers. More complex queries still require the time-dishonored worksheet criteria range.

Gone is the need for a predefined database range. When you choose a Data command, Excel finds the database automatically by examining the region surrounding your cell pointer. It's even smart enough to distinguish field headings from records and exclude the former from sort operations.

A new Subtotals command inserts aggregate formulas at points where field values change. These formulas can be based on any of the standard statistical functions (sum, average, count), and the subtotaled list is automatically outlined, allowing you to toggle easily between forest view and tree view. The Autosum button, meanwhile, has been educated to recognize the presence of subtotal formulas and exclude their results from its grand-total calculation.

Excel's charting component has been enhanced to accommodate donut charts (multiple-series pies), as well as automatic trendlines and error bars. And because charts are seldom static, Excel 5.0 lets you add new series or new data points by dragging worksheet cells to the chart.



PIVOT TABLE: *Drag the field headings to change a multidimensional crosstab report.*

PIVOT TABLES

But the *pièce de résistance* of new analytic features is the PivotTable Wizard, which transforms inscrutable list-based information into dynamic crosstab reports. Like categories in an Improv table, the field headings in these reports can be transposed at will across row, column, and page axes, letting you find the slice that gives you exactly the information you need and lay it out for maximum impact.

This is a reporting tool, not a modeling language (you have to start out with some kind of database), but it includes commands for producing a variety of internal calculations (percents of totals, period-to-period changes, and so on), and it's effectively linked to the charting module. Rearrange a pivot table and the chart gets rearranged as well. Also, unlike a similar feature in QPW, the Excel Wizard can be applied to external as well as internal data.

Based on informal testing, the calculation engine of Excel 5.0 appears to be as quick as that of Excel 4.0. But because the .EXE file has grown from 2.7MB to 4.2MB, you can expect to see more disk activity as you work in Excel 5.0. To run this program efficiently, you are going to want to have 8MB of RAM—and more wouldn't hurt. The document-centric OLE 2 world will demand lots of memory in any case, and with Excel 5.0 Microsoft has moved us quite a bit down the road in that direction.

• List price: *Microsoft Excel 5.0 for Windows, $495; upgrade, $129.* Requires: *4MB RAM (8MB recommended), 15MB hard disk space, Windows 3.1. Microsoft Corp., One Microsoft Way, Redmond, WA 98052; 800-426-9400, 206-882-8080.*

Circle 425 on reader service card

■ Presentation Graphics

Charisma 4.0 Is Best for Design-Intensive Presentations

BY LORI GRUNIN

Version 4.0 of Micrografx Charisma brings the Atomic Age to presentation creation, in two senses of the word. This long-awaited update of the $495 package gives you unprecedented power for mixing and matching pieces of existing presentations, as well as for designing new ones—but only at the expense of an excessively fragmented interface.

Users of the previous version will find very little that's familiar in the new version—thankfully, the program no longer uses the confusing virtual page setup—although users of other Micrografx products will feel right at home with its context-sensitive tool ribbon and mouse-button menu selections.

Charisma's facelift isn't just skin-deep, though. It's a totally different and significantly beefed-up product, which now adheres to many of the operational conventions of its competition.

NUTS AND BOLTS

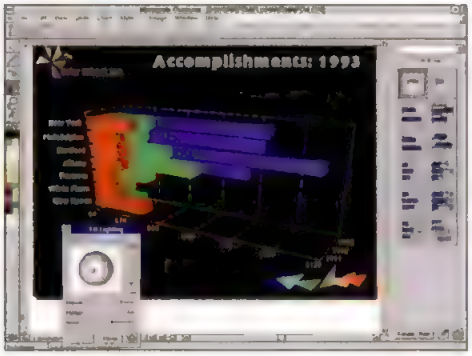
Each Charisma Master Style—the set of elements used to maintain a consistent look throughout a presentation—comprises a color scheme, text scheme, and set of page layout templates and backgrounds. You can mix and match each of these schemes among presentations; you can also modify them or create your own sign styles.

In some ways, Charisma mimics the design structure of products like Harvard Graphics, Lotus Freelance Graphics for Windows, and Microsoft PowerPoint. For instance, the page layout templates contain double-click-here placeholders that prompt you for text, chart, symbol, OLE object, or multimedia entry. In other respects, though, it goes its own way. Rather than making you enter a separate view to create templates, for example, Charisma can generate a template or background scheme from an existing slide. The package also offers complete flexibility over the design of speakers' notes and handouts, a unique capability.

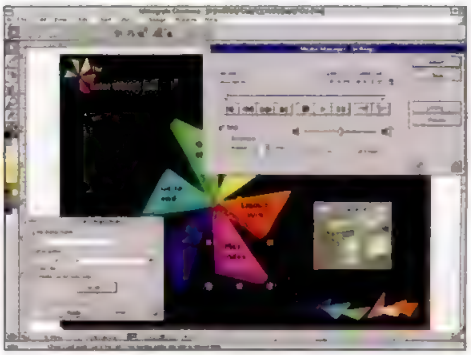
Generating a presentation using one of the 77 simple but attractive predefined styles is a fairly painless process. Charisma prompts you through the start-up process to choose a target device (such as an on-screen slide show), a Master Style, and a template for the first slide.

Although you cannot apply templates or other design elements in outline view, Charisma will in some cases automatically select a new template based on the changes you make. For instance, if you add text to a slide containing a data chart and using the 1 Chart template, the product will switch to the Body Text and Chart template. Like most "intelligent" features, this works most of the time but occasionally gives unexpected results, such as not reverting to the 1 Chart template if you delete all the body text.

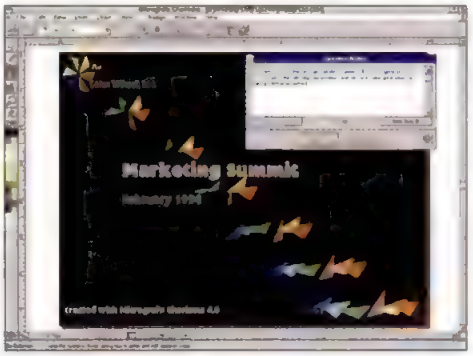
Charisma has an excellent array of text-formatting tools, including control over interparagraph, interline, interword, and intercharacter spacing; it also supports manual pair kerning. You can select bullets from a font, a piece of clip art, or a graphic pasted in from the clipboard. The product cannot automatically number pages or put the date on each slide.



LIGHTING EFFECTS: *Changing the light source attributes of Charisma's 3-D objects and charts adds emphasis.*



SOUNDS GOOD: *Charisma's built-in Media Manager controls playback attributes for sound, video, and animation.*



NOTE BENE: *Speakers' notes pop up in Charisma's slide view for easy entry.*

DEALING WITH DATA

Charisma has long been used for data charting by scientists and engineers, Micrografx let its lead in this area slip to Stanford Graphics and DeltaGraph Professional. Version 4.0 makes no attempt to recapture the technical charting market, offering instead a slightly broader-than-standard array of 2-D and 3-D business chart types.

Overall, its data handling disappoints. It imports a reasonable selection of data types, offers a limited and bizarre set of math functions (for example, it can calculate running totals and sort but not sum a row or column), and provides flexible date and time entry. Although it brings up a copy of the source spreadsheet during import, you can't select discontiguous ranges; you have jump back and forth until all the desired data has been copied. You can link to an external data file but only though a Paste Link, so you must have the source application. Finally, *all* the data in the sheet gets charted; you can't hide selected series.

The package's real data-charting strength now lies in its formatting interface: All of a chart's formatting options (of which there are an excellent selection) are manipulated via a context-sensitive panel on the right side of the screen. This eliminates excessive hopping around menus and dialog boxes and greatly streamlines operation.

GREAT ILLUSTRATION

Drawing has traditionally been Charisma's other strength, and the new version offers the best illustration tools of any presentation product now on the market. The tools themselves—which in-

Continues on page 42

The Apple Report On PowerPC

Number 2 – RISC Performance and Cross-Platform Compatibility

Many of the most popular applications have been or are being optimized to take advantage of the high-performance PowerPC processor.

PowerPC chips are faster and less expensive than Pentium chips – so are the personal computers they will run.

A complete Macintosh system with PowerPC will cost well under $2,500, but will offer better performance than higher-priced Pentium-based systems.

With SoftWindows, Macintosh with PowerPC will have the ability to run DOS and Windows applications, unmodified.

For more information about Macintosh with PowerPC, call 1-800-732-3131, ext. 150, in the U.S. We'll send you a copy of our informative, free booklet, *PowerPC Technology: The Power Behind the Next Generation of Macintosh Systems*. In Canada, call 1-800-665-2775, ext. 910.

In the first half of 1994, Apple will introduce a new family of computers that already has the entire computer industry standing on end.

They will offer better performance than computers based on the X86 microprocessors. They will be extremely competitive on a price basis. And they will be compatible with Windows and DOS applications, by using SoftWindows software.

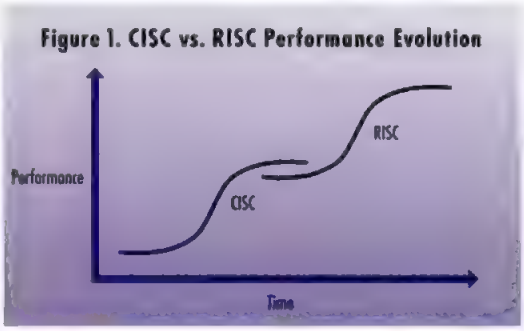
They will be based on the revolutionary new PowerPC™ microprocessor, created jointly by Apple, IBM and Motorola.

For the first time, desktop personal computers will take advantage of RISC chip architecture previously found only in high-performance workstations. This advance will make possible quantum improvements in the way we manage and work with information.

RISC vs. CISC.

Tremendous advances have been made in CISC architecture over the years. However, the physical limitations of the new, high-performance CISC design mean that CISC chips must be significantly bigger and more complex, and must run at hotter temperatures to perform the same tasks as comparable RISC chips. Consequently, the newer

Figure 1. CISC vs. RISC Performance Evolution



generation of CISC chips, like the Pentium, are much more expensive to manufacture. Which means that personal computers powered by PowerPC chips can offer a significant advantage in price as well as in performance.

As you can see on the chart, RISC microprocessors offer dramatically greater potential for growth, leading us well into the next century and increasing the practicality of features like voice recognition, videoconferencing, object-oriented software and multimedia capabilities – functions that will be integral to doing business in the 21st century.

More compatible personal computers.

Apple's new generation of Macintosh® personal computers built around the PowerPC chip offer the ability to run MS-DOS and Windows applications, as well as Macintosh software. Moving from one environment to the next will be seamless and, even more importantly, it will be effortless.

PC users who move to Macintosh with PowerPC will gain access to the large number of new applications which take advantage of the incredible performance of the new PowerPC chip.

Higher-performance optimized applications.

When PowerPC microprocessor-equipped Macintosh computers begin shipping, software developers including Microsoft, WordPerfect, Adobe, Aldus and Claris will begin shipping new versions of their most popular software, specifically rewritten to take full advantage of the new processor's capabilities.

These optimized, sometimes called "native," applications will offer significantly faster performance than their MS-DOS, Windows or current Macintosh counterparts.

Unprecedented value.

Because RISC-based personal computers cost less to manufacture than equivalent systems based on CISC chips, we will be able to make this technology available for well under $2,500 for a complete mainstream desktop system*. Competitive with a lower-performance, Pentium-based PC.** Watch for Apple Report #3, coming soon.

Apple

*A complete Macintosh system with PowerPC includes computer, keyboard, monitor and Macintosh OS. Prices subject to change without notice. **Based on current applications level testing as of January 1994. ©1994 Apple Computer, Inc. All rights reserved. Apple, the Apple logo and Macintosh are registered trademarks of Apple Computer, Inc. PowerPC and the PowerPC logo are trademarks of International Business Machines Corporation. MS-DOS is a registered trademark of Microsoft Corporation. Pentium is a trademark of Intel Corporation. SoftWindows is a trademark of Insignia Solutions, Inc.

Charisma 4.0

CONTINUES FORM PAGE 40

clude Bezier curves, blends, extrusions with light-source control, warps, and text on a path—are a subset of those found in Designer, implemented differently in order to be easier for illustration novices to understand. Charisma also includes Picture Publisher's Effects Browser for quickly adding special effects to scanned images.

SCREEN SHOW

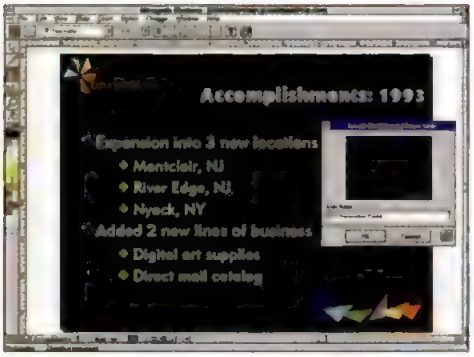
There are notable changes to Charisma's screen-show capabilities as well. The program supports up to 32,000 layers per slide, which are used for transition effects, automatic builds, and the timing of multimedia elements. The program can automatically build the elements within a text block in addition to building a slide one layer at a time.

Micrografx has also enhanced Charisma's support for sound, video, and animation. The program uses a built-in Media Manager that lets you create keyword-searchable media catalogs, allows you to preview multimedia files, and controls duration, volume, fade, repetition, and cropping. A clip can be triggered by a Hyperlink button (Hyperlinks also support navigating around presentations and launching external applications) or played automatically when its layer transitions in. You can also play a MIDI file as background music for your presentation.

Charisma now generates standalone presentations (which run only under Windows but each compile as a single binary file) and can automatically collect all related files, as well as break the presentation across multiple floppy disks.

FOR POWER USERS

It takes a fairly powerful system to harness all this flexibility, as reflected by Micrografx's recommendations for the product: a 486 with 16MB RAM. While it performed well on a 486/66 with 28MB RAM, pulling up the text scheme dialog was noticeably sluggish on the font-heavy machine. The only serious bug that we encountered, which Micrografx is in the process of correcting, was a crash that occurred when printing speakers' notes to a PCL 5 printer with Charisma swapping in a gray-scale palette.



TEMPLATES BY EXAMPLE: *Charisma lets you turn customized slides into templates that you can use again.*

While not recommended for users looking for a package to generate canned presentations quickly—the competition still does that better—Charisma's powerful illustration tools, combined with the ability to micromanage the different elements of a Master Style, render it a great program for design-intensive presentations, and its screen-show intelligence exceeds that offered by most of the competition.

• List price: *Micrografx Charisma, Version 4.0, $495; upgrade, $149.95.* Requires: *8MB RAM (16MB recommended), 12MB hard disk space (CD-ROM drive recommended), Windows 3.1. Micrografx Inc., 1303 Arapaho, Richardson, TX 75081; 800-733-3729, 214-234 2769; fax, 214-234-2410.*

Circle 423 on reader service card

■ **Alternate Input**

Explore Pen Computing with $399 Handwriter for Windows

BY BRAD GRIMES

The future of pen computing may still be in doubt, but Communication Intelligence Corp.'s $399 Handwriter for Windows is a great place for the uncertain or uninitiated to start looking ahead, especially at its introductory price of $199.

It used to be that if you wanted to use CIC's award-winning Handwriter Recognition System, you had to buy expensive pen PCs from vendors like Dauphin, IBM, or NEC. Now the system is on its own, bundled with Microsoft Pen Extensions for Windows and a lightweight tablet from industry leader CalComp.

With Pen Extensions for Windows, the pen becomes an absolute pointing device, meaning that wherever you put it on the tablet is where the cursor appears on-screen. Once you get used to navigating, pointing, clicking, and editing with a pen, you'll discover that you can work smarter in certain applications. You can work entirely with the pen, or revert to the keyboard and mouse.

The CalComp tablet is thin and lightweight, with a 25-pin serial connector (plus a 25-pin-to-9-pin adapter) and a 10-foot cord so that you can relax with the tablet in your lap as you operate your system.

MOUSE TRAP: *Handwriter does everything a mouse does, and much more.*

Handwriter for Windows is easy to install. You just attach the tablet to your serial port, plug it in, and install the software. If you're not using a standard Windows video driver, however, you'll get a message during installation that says your driver isn't pen-compliant. Everything will install, and the pen will operate, but you won't see the pen's "ink" on-screen.

Once you've installed Handwriter for Windows, Pen Windows becomes your graphical environment, and there's no simple way to uninstall it. The program saves copies of your important Windows start-up files, so if you decide you're a keyboard user for life, you have to replace the Pen Windows start-up files with your old ones manually.

Even if you ultimately decide pen computing is not for you, Handwriter for Windows gives you a fun, relatively inexpensive glimpse at technology that's still poised to change the way you compute.

• List price: *Handwriter for Windows, $199 until February 28, $399 thereafter). Communication Intelligence Corp., 275 Shoreline Dr., Redwood Shores, CA 94065-1413; 800-888-9242, 415-802-7888; fax, 415-802-7777.*

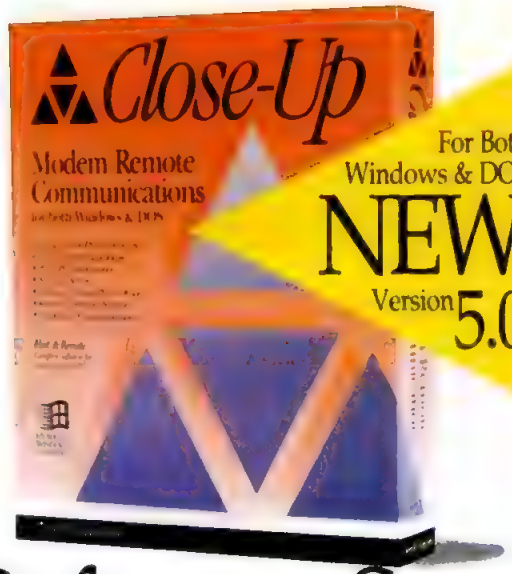
Circle 418 on reader service card

WinBench™ 3.11 by Ziff-Davis Labs Tests Remote Windows™ Speed

This graph shows the speed of the three leading remote control programs when transferring Windows screens. As you can see, Close-Up handles more pixels, faster, meaning you spend less time waiting for Windows screens.

The industry standard test, WinBench 3.11, is perfect for testing the speed of remotes. It is an accurate measure of video throughput. Video throughput is the limiting factor in remote operations, because remote programs must transmit Windows video functions from one PC to the other.

WinBench scores (average of 10 runs):
Close-Up 1,613,118
pcAnywhere 194,093
CarbonCopy 168,397



New Remote Software Sets Windows Speed Record

Communicate Faster & Easier

Close-Up® lets you communicate faster & easier with five exciting technology firsts.

Close-Up is the only remote communications software that won both PC Magazine's coveted "Editors Choice" and PC World's "Best Buy" awards. Now Close-Up has a new faster & easier version that allows you to view and control another PC by modem as if you were there!

Technology Firsts
1. *AI Video Compression*
2. *Photographic Memory*
3. *Non-Intrusive Technology*
4. *Expert System*
5. *Video Translation*

Why Is Close-Up So Fast?

Close-Up learns as it works. It uses AI (Artificial Intelligence) to compress all Windows video function calls. That's why Close-Up does so well in Windows Benchmark tests (see WinBench 3.11 chart).

Close-Up uses its revolutionary Photographic Memory™ so that once Close-Up has seen all or part of a Windows screen, it's memorized. Then as screens change, Close-Up only transmits new unmemorized data. Incredibly, with this technology ***Close-Up gets faster & faster the longer you use it.***

What Remote Companies Haven't Told You

Other remote programs permanently slow Windows and usually reduce your video resolution and depth of color, even when they are not in memory. That's because they permanently change your system.ini file. Close-Up's breakthrough Non-Intrusive Technology does not modify any of your sensitive Windows files including the system.ini. Close-Up is the only remote that when not in use, allows Windows and your PC to run at normal optimal levels.

Expert System Makes Communications Easy

You don't have to be a communications expert to get the results of one. Close-Up has an Expert System that automatically analyzes system components and configures your system for optimal speed.

Video Translation

With Close-Up, dissimilar PCs can easily connect, because Close-Up senses the video capabilities of both PCs and automatically displays Windows in a video mode compatible with both sides.

Risk-Free Offer!

RISK FREE GUARANTEE MONEY BACK

Try Close-Up. If you're not absolutely convinced that Close-Up 5.0 is the fastest remote program, we'll give you your money back!* Order Close-Up Host & Remote, a complete system, for only **$199.95**

Upgrade your current or competitive remote program to new Close-Up 5.0. Get both sides, Host & Remote, for only **$69.95**

Order Today 805-964-6767

Norton-Lambert

We invite you to reproduce this test. We used two identical Gateway 4DX2-66V's with 66-MHz Intel 486DX2-66 CPUs, 16 MB RAM, 256KB RAM cache, 340 MB HD, IDE controller, no hardware disk cache. Video: Local Bus ATI Ultra Pro with 2MB VRAM, 640 by 480 pixels, 16 colors, VGA.DRV dated 3/10/92. Monitor 72 Hz. MS-DOS 5.0, SMARTDRV 2 MB cache. Modems: two 14,400 baud V.32bis. Test performed without verification by Ziff. All products are shipping versions. WinBench trademark of Ziff Communications Co. Windows trademark of Microsoft Corp.

*60 day money-back guarantee if purchased directly from Norton-Lambert. Offer expires 6/30/94. All prices in US Dollars. Prices exclude shipping.

© 1994 Norton-Lambert Corp., P.O. Box 4085, Santa Barbara, CA 93140 USA Phone (805) 964-6767 Fax (805) 683-5679

CIRCLE 346 ON READER SERVICE CARD

■ Scanners

Canon IX-4015 and Ofoto 2.0 Combine For Color Scanning

BY LORI GRUNIN

Been eyeing a 24-bit flatbed scanner like the HP ScanJet IIcx but need something a bit more compact? Competitively priced at $1,175, the Canon IX-4015 and its software companion, Ofoto, Version 2.0, give you attractive color scans while taking up less desktop space.

With a footprint of 11.25 by 15.75 inches, the IX-4015 fits comfortably just about anywhere; the tradeoff, of course, is that you can't scan anything larger than a letter-size page. The top lifts for scanning pages from books.

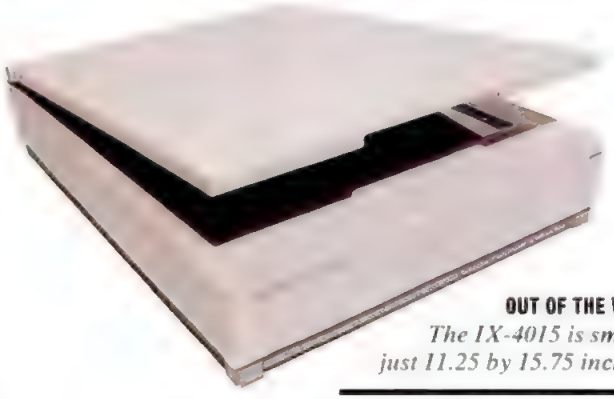
The 8-bit NCR SCSI card that ships with the scanner installs fairly easily, although you may have to flip a DIP switch to accommodate address conflicts. Getting the NCR SCSI card to work in a system already inhabited by an Adaptec SCSI adapter was no problem. Note, though, that you can't daisy-chain other devices with the scanner.

XENON BULB

The scanner's quality proved satisfactory, with good color registration and a fairly tight color balance. Credit for these goes largely to the Xenon bulb that the unit uses during its single-pass scan. Unlike fluorescent bulbs, the Xenon bulb doesn't flicker and therefore provides a more consistent light source for scanning.

The minimalist Twain driver that allows the scanner to work with applications other than Ofoto generally yielded very dark scans in its default configuration, but the driver lets you alter the brightness, contrast, and gamma settings for scanning. Scanning with Ofoto resulted in brighter, more balanced images.

At an optical resolution of 400 dots per inch, the IX-4015 suffices for most low-resolution imaging needs; however, it can interpolate up to 400 by 800 dpi in color mode or 400 by 1,200 dpi in monochrome. When using the Twain driver, the scanner proved exceptionally speedy. With Adobe Photoshop, it took only 23 seconds to scan a 4- by 5-inch section of a photograph at 300 dpi with 24-bit color. This rate significantly outpaced the scanners PC Labs recently evaluated (for reviews, see "In Living Color," February 8, 1994). Scanning the same image in Ofoto, even with all automatic functions turned off, took more than twice as long.



OUT OF THE WAY: *The IX-4015 is small, just 11.25 by 15.75 inches.*

OFOTO FOR COLOR SCANS

As newsworthy as the scanner itself is its included Ofoto scanning software (from Light Source Inc.). On the surface, the software looks a bit spare. Unlike photo-retouching programs such as Photoshop, Ofoto includes only a few tools for manually improving images. The program excels at helping you set up output device calibrations that ensure consistent image appearance across a variety of output devices and applications.

Calibration is easier than in the previous, gray-scale-only version. Essentially, you print out a supplied chart, then scan it back in; Ofoto registers the differences and uses the information to compensate between the input and output. If you are printing the image from another application, such as PageMaker or QuarkXPress, then you would print out the chart from within that application and scan it back into Ofoto.

Ofoto's calibration technology, called Appearance Equivalence Space, works very well. Printouts of the same image on different types of color printers from a variety of applications yielded amazingly similar output.

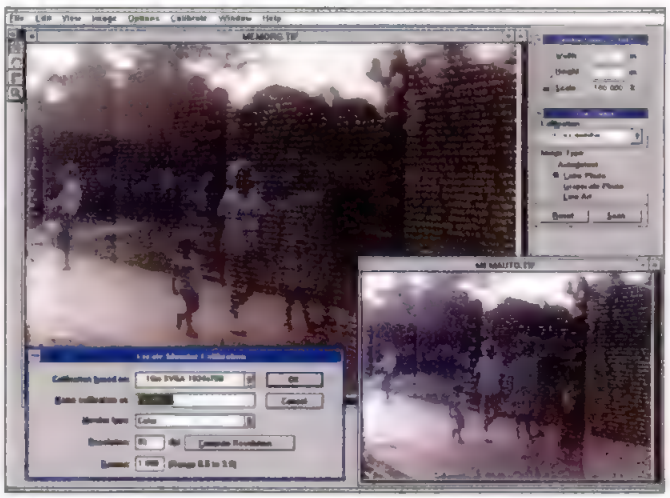
In addition to its color matching, Ofoto has a few other unique features. It can scan in the background with no more system degradation than you might have during a file download.

Most important, perhaps, is Ofoto's capacity to let you work with a low-resolution preliminary scan of an image (among other things, you can crop, rotate, change brightness and contrast, sharpen, and straighten images), then scan the image at a higher resolution. Ofoto can also perform automatic runs in which it finds the picture on the scan bed, determines whether it is gray-scale, color, or line art, crops out unwanted areas of the picture, straightens it, and adjusts the highlights and shadows.

If you already own a scanner or don't want the IX-4015, you'll be able to buy a standalone version of Ofoto in the second quarter of this year; it's worth it if you don't have the retouching skills required by products with more sophisticated manual features or if you could benefit from the background scanning. This scanner/software combo is an attractive alternative for adding color to your small-office or home-office work.

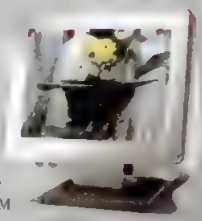
• List price: *Canon IX-4015, $1,175. Canon Computer Systems Inc., 2995 Redhill Ave., Costa Mesa, CA 92626; 800-848-4123; 714-438-3000; fax, 714-438-3099.*

Circle 432 on reader service card



BALANCING ACT: *Ofoto automatically removes color casts.*

High-Tech, High-Fashion Monitors, for the Ecologically Minded.



ADI introduces *the new look* in Energy Star-compliant monitors. The smart look of high-fashion design with low-energy usage.

Our quality 14-,15- and17-inch MicroScan™ models outsmart the competition with their built-in microprocessor intelligence. They give you cutting-edge digital control over the look of your high-res graphics. And they save energy by automatically lowering power usage in sleep mode–which, for a typical company site, can save up to $5500 per year.

MicroScan monitors go with just about any video outfit. From VGA, SVGA and XGA to VESA modes–up to 1280 x 1024, non-interlaced. Their 72 Hz, flicker-free operation is always easy on the eyes. And their ergonomic features meet all major EMI and safety requirements around the world.

So go ahead. Make a fashion statement that's environmentally sound. Call **(800) 228-0530** for the name of your nearest ADI dealer. For faxed product information and editorial review, dial **(800) 767-8182.**

March 16, 1993
ADI MicroScan3E+

EDITORS' CHOICE

ADI

ADI Systems, Inc.
2115 Ringwood Avenue
San Jose, CA 95131

To order call:

SOURCE 1(800) 550-9866

All company and/or product names are trademarks or registered trademarks of their respective owners.

CIRCLE 226 ON READER SERVICE CARD

■ Communications

LapLink Unplugged! File Exchange, Remote Access Without Wires

BY BILL MACHRONE

Traveling Software's LapLink has always been the best way to get files from your laptop to your desktop and back again. Its history is studded with firsts: remote installation, data compression, parallel-port operation, modem operation, and printer redirection.

Traveling Software's latest coup eliminates the one final obstacle to easy file transfers: the wire itself. Instead of being tethered to the desk, the $299.95 LapLink Wireless lets you work anywhere in your office while sacrificing none of the flexibility you've come to expect from LapLink.

AIRSHARE: *Two modules are included.*

AIRSHARE MAKES IT HAPPEN

The secret is AirShare, a pair of modules that plug into the serial ports of your laptop and desktop machines. The slim gray devices, smaller than a pack of cards, are transceivers that operate at 900 MHz, the same band as the new digital portable phones. The modules have a range of over 30 feet directly and can work through walls at shorter distances. Using AirShare is identical to being hooked up via a serial cable. The LapLink software has no idea, in fact, whether it's talking through AirShare modules or through a serial cable. The modules will even transfer data at 115 kilobits per second; however, handshaking adds 5 to 7 seconds to a 30-second transfer.

The AirShare modules are a joint development between Traveling Software and National Semiconductor, and they are pretty much the state of the art in miniaturized radio-frequency electronics. They come with a variety of power options: a pair of 9-volt batteries, a plug-in adapter for your desktop system, and a special cord that swipes power from your laptop's PS/2 mouse port. The modules have two LEDs that tell you when they're activated and when they're connected, and have a switch that lets you choose among three channels to avoid interference with others in the office who may be using AirShare.

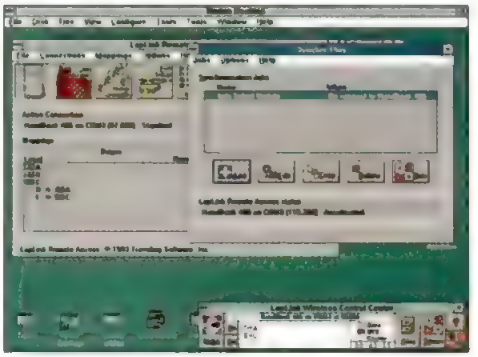
We made line-of-sight connections at 40 feet, and connections through walls, ceilings, and floors at up to 25 feet. When you approach the extremes, a person standing in the doorway or walking between you and the target machine may be enough to interrupt the connection. No matter; if the interruption is brief, the software recovers gracefully and resends the data. Most of your AirShare use will probably be in the same office, even on the same desk, as your target machine.

SOFTWARE STEALS THE SHOW

As good as the hardware is, however, the real star of the show is the software. If you're still using one of the older or stripped-down versions of LapLink that came with your laptop or Microsoft's Interlnk, you owe it to yourself to check out the included LapLink Remote Access. LLRA is LAN-like in that it uses the file management tools you already have. Your system sees the remote drives as additional drives, so you can use the File Manager or any Windows shell, the MS-DOS Shell, or any other shell program, or simply the Copy command to move files around. If your host machine is on a LAN, you can browse files on the network and run remote programs on your local machine. Unlike remote-control programs, you're running the program on your on your local PC; only the disk drive is remote.

LLRA also redirects printers. You can print on local or remote printers, and the program comes with clear, simple instructions for loading remote printer drivers from the host system to your laptop.

Synchronizing files between your desktop and laptop machines has always been a problem, and Traveling Software has had a variety of solutions over the years. SynchroPlus, included with LLRA, is the best yet. It lets you define the files and directories that you want to keep the same. You can either define one directory as the master or set them both up as bidirectional. Traveling Software has given considerable thought to the inevitable conflicts that arise when you synchronize directories on two machines in active use. Special screens show you the nature of the conflicts and let you choose a number of options to resolve them. In our testing, we found no situations that it could not handle.



CONTROL CENTER: *File syncing is easy*

You can set up SynchroPlus to begin jobs automatically as soon as your machines are within range of one another or if they're connected by cable or modem. You'd be well advised to use LLRA's security features, which force you to enter a password. That prevents someone with a laptop and an AirShare module from "trolling" for connections and snooping through your machine.

LapLink Wireless is one of those rare combinations of hardware and software in which everything works to make the whole greater than the sum of its parts.□

FACT FILE

LapLink Wireless, Version 1.0

Traveling Software Inc., 18072 North Creek Pkwy, Bothell, WA 98011; 800-343-8088, 206-483-8088; fax, 206-487-1284.

List price: $299.95.
Requires: 2MB RAM, 1MB hard disk space, DOS 5.0 or later; Microsoft Windows 3.1 optional
In short: With its included AirShare transceivers, LapLink Wireless lets two PCs connect for file exchange and remote access at up to 40 feet.

A21 ON READER SERVICE CARD

Competitive Upgrade Offer

In a perfect world, you wouldn't need OCR software as accurate and friendly

WordScan® Plus 2.0: OCR for the Real World from Calera.

WordScan Plus 2.0 is OCR for the real world. It reads virtually every document including faded photocopies and marked-up memos. It integrates seamlessly with familiar Windows applications. And it's easier to access and use than ever before.

Accuracy and Productivity You Can Count On

"Wordscan Plus 2.0 sports a polished Windows interface, top accuracy, and an abundance of productivity enhancements."
InfoWorld, November 1993

"Anyone who does OCR is looking for an OCR engine that reduces errors. Adaptive Recognition Technology, the core of Calera's Wordscan 2.0, does just that."
Imaging Magazine, September 1993

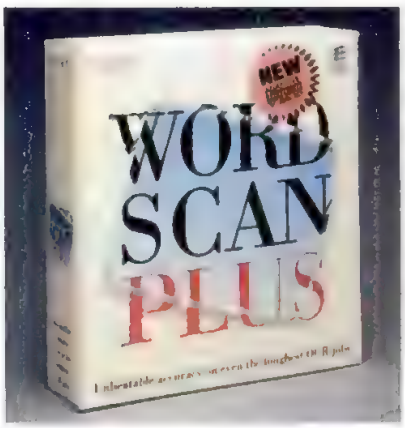
"Wordscan Plus 2.0 provides improved character recognition for poor quality documents such as faxes and photocopies. The result is an efficient and more accurate OCR program…Superior OCR technology."
PC World, November 1993

"After a long testing period with scanned documents, graphics files of various formats and faxes of incredibly poor quality, the verdict is that Wordscan Plus is an impressive product."
Personal Computer World, November 1993

"Easy to use OCR package with impressive ability to cope with poor quality images."
Personal Computer Magazine, November 1993

"If faxed documents were perfect, any OCR package could read them. But it's the fly tracks, smudged letters, and muddy photocopies that…put such a hit on productivity… Calera has…come up with a pair of OCR packages that offer greater accuracy…"
PC Computing, November 1993

CIRCLE 341 ON READER SERVICE CARD



Friendliness You'll Welcome

With WordScan Plus, you get an icon-based toolbar that takes full advantage of the user-friendly Windows operating environment you've come to appreciate. For support during OCR operations, simply refer to the helpful tool bar with its exclusive HoverHelp™ feature. Just point to any icon with your mouse and get a clear, concise explanation about the selected function.

The OCR Aware™ function in WordScan Plus lets you access complete OCR capabilities from *within* your favorite applications—without a lot of closing and opening of windows. And, WordScan Plus was the *first* OCR product to support Microsoft's OLE 2.0. Simply click on the image you want to OCR, then *drag and drop* the image to the WordScan icon or window.
Now *that's* friendly.

You can call on new fax support capabilities to view and OCR faxes. Then use the E-mail support feature to quickly route text or image documents—all without ever leaving WordScan Plus.

This is OCR for the real world. This is what you've been waiting for.

Publish '93 Readers' Choice Award

PC MAGAZINE Editors' Choice

Imagina Product of the Year 1992

New Competitive Upgrade Offer!
OmniPage and other PC OCR software owners can upgrade for *only* $149!
Great pricing, limited time offer.

Call **1-800-224-0660 ext. 100** for complete details of this special offer or for the Calera dealer nearest you.

OCR FOR THE REAL WORLD

CALERA
RECOGNITION SYSTEMS

© 1993 Calera Recognition Systems. Calera and WordScan are registered trademarks. Adaptive Recognition Technology, OCR Aware and HoverHelp are trademarks of Calera Recognition Systems
All other products and brands are the property of their respective trademark holders. Offer valid in USA and Canada only.

CD-ROM

CD PowerPak: Everything You Need to Enjoy Your CD-ROM Drive

BY JAMES KARNEY

Corel Corp.'s $99 Corel CD PowerPak is a real multimedia bargain, bringing together a variety of tools for CD-ROM operation, including drive setup utilities, caching software, a PhotoCD editor, an audio CD player, a .WAV file recorder/editor, a graphics file manager, a wallpaper changer, and a CD browser. You also get two CD-ROMs with 100 Kodak PhotoCD images and .WAV files, plus a pair of KOSS headphones.

If you're installing a SCSI-based CD-ROM drive, the PowerPak contains setup software on a floppy disk that will automatically configure most ASPI (Advanced SCSI Programming Interface) host adapters and drives. Corel provides its own version of the MS-DOS CD-ROM Extensions. This driver provides much greater control than the Microsoft version and includes caching and the ability to set drive options with menus.

ALL-IN-ONE: *The Corel CD PowerPak is crowded with useful CD-ROM utilities.*

We used the PowerPak to set up both an external Toshiba CD-ROM drive on a Pentium-based system with built-in SCSI and an internal NEC CD-ROM drive on a 66-MHz 486 system with an UltraStor SCSI adapter. Both worked well.

Corel's utilities help you fine-tune CD-ROM operations and check out your system and Windows installation. SCSI Config lets you see the current configuration of your CD-ROM drives and modify the cache and audio options. CorelBook, a CD and system browser, tells you all you ever wanted to know about drives, TSRs, and address settings.

The rest of the software in the box and on the two CD-ROMs falls more into the fun category. If your drive supports Kodak PhotoCD images, you can build slide shows, create catalogs of images, and modify the size and resolution of pictures with Corel's CDLab. Mosaic, the same graphics file manager shipped with CorelDRAW, Version 4.0, offers image previews, drag-and-drop coping, and database catalogs for all major graphics formats.

• List price: *Corel CD PowerPak, $99.* Requires: *1MB RAM, 5MB hard disk space, Microsoft Windows 3.1, ASPI-compatible SCSI host adapter or supported CD-ROM Interface, CD-ROM drive. Corel Corp., 1600 Carling Ave., Ottawa, Ontario, Canada K1Z 8R7; 800-722-6735, 613-728-8200; fax, 613-761-9176.*

Circle 424 on reader service card

Brainstorming

IdeaFisher 5.0 Spurs Your Creative Thinking

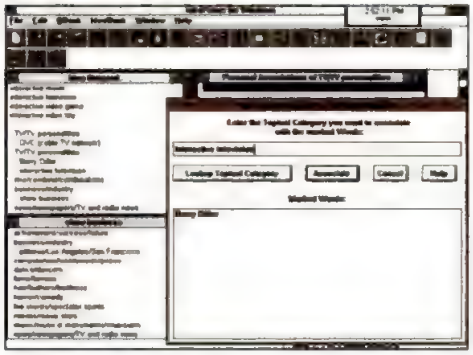
GREG PASTRICK

You say information superhighway, I say beefalo. On the face of it, those are two very disconnected concepts, but between them is a connective fabric of associative threads and references from IdeaFisher for Windows' database of more than 775,000 idea associations. If you want to get your creative juices flowing for ad campaigns, marketing proposals, or just about anything else, you can pick your way through this program's database of over 6,000 focused questions designed to help you give shape to unformed ideas no matter how unique (or unusual) your first thought may be.

Associative thinking and generation of new points of view are the key concepts behind IdeaFisher ($199). To achieve its purpose as a creative-thinking tool, the program relies on two primary databases.

The IdeaBank is a collection of ideas, words, phrases, names, titles, and events culled from broad sources and references covering popular culture, business, science, history, literature, sports, politics, and technology. It's a diverse compilation of material organized into topical categories (for example, TV/TV personalities) linked to section titles (varieties/examples, people/animals, things/places, verbs, or descriptors), supplemented by customized personal associations (Barry Diller), and all recorded in an endless stream in a window called the Idea Notepad.

It's an up-to-date database, too. Out of the box you get creative references and prompts from words like fetal-tissue research, QVC, and Hill and Bill.



YOUR INPUT: *You can build more associations by adding names and ideas to the database.*

The Qbank is a collection of focused questions (How timely is your idea? Is the timing right?), organized by task (marketing strategy, name development, story and scriptwriting, to name a few), supplemented by add-on modules (Business and Grant Proposal, Speech and Presentation, Strategic Planning), and recorded in the Answer Notepad window. The questions help you collect and structure your ideas and information.

IdeaFisher was a windowed product even in DOS, but its new Windows interface really pays off. The random resorting or reordering of ideas with the click of button gives you a whole new way of looking at those ideas, and the ability to customize existing databases and add-on modules gives the program an extra shot of creative versatility.

• List price: *IdeaFisher for Windows, Version 5.0, $199; add-on modules, $79 to $99.* Requires: *2MB RAM, 5MB hard disk space, Windows 3.0 or later. IdeaFisher Systems Inc., 2222 Martin St., #110, Irvine, CA 92715; 800-289-4332, 714-474-8111; fax, 714-757-2896.*

Circle 426 on reader service card

TOP TEN REASONS TO BUY A ZEOS®

10. STELLAR PERFORMANCE. We outperform the competition time and time again. We're not making this up! Check out what *PC Magazine* said: "The stand-out was the ZEOS 486DX2-66 system that blew all competitors away–in some cases performing more than ten times as fast as the competitors." We think that's pretty cool!

9. SUPERIOR QUALITY & RELIABILITY. We manage our own research and development subsidiary, PCTech, which designs our own systems. Plus, we use high-quality, technologically-advanced components, making your computer a superior and reliable product. The result: we've won more *PC Magazine* Readers' Choice for Service and Reliability awards than any other–five in all!

8. COMPATIBILITY. Everyone needs to be compatible. Upgradable and Pantera systems are 100% compatible with every major network operating system…including Novell Netware! We conform to the most popular standards: ISA and VL slots in the Upgradables, and ISA and PCI slots in the Pantera. Plus, we vigorously adhere to the VL and PCI guidelines to ensure your hardware works flawlessly.

7. AWARD-WINNING REPUTATION. We are consistently on top–review after review, article after article. Our systems are cited for Superior Quality, Best Buy, Excellent Service and Reliability, and so much more. We treasure all the Editors' Choice awards, but what really matters is what our customers think. If readers' awards, phone calls, letters of support and second-time buyers are any indication, they love us! And we love that!

6. EASY PURCHASING. Order any time, day or night. We're always open. And we offer many payment choices: MasterCard, VISA, American Express, Discover, Corporate Purchase Orders, Business Leasing, and COD. Or call now and we'll fax or mail you a Z-Card℠ application, our own credit card with no annual fee!

5. TOLL-FREE SUPPORT & MORE. Need an answer now? Our Technical Support Crew can give it to you 24 hours a day–every day. And it's free! What's more, every system you purchase includes a One Year Limited Warranty and a 30-Day Money Back Guarantee. Plus, all desktop and vertical systems include Express Parts Replacement. No long waits! No hassles!

4. ONE-STOP SHOP. When it comes right down to it, it's all about choices. What company? What product? With ZEOS, you get an experienced company with well-trained Systems Consultants ready to help you. We offer a wide variety of quality products from 486 desktops to Pentium processor-based verticals to notebooks and subnotebooks. Special orders don't upset us! Within each product line, you can choose from one of our many money-saving packages or we'll custom-build one to your exact needs. Plus, we offer affordable upgrades and options. We have what you need and that makes your life easier.

3. ZEOS UPGRADABLES...

3. ZEOS® Upgradables- The Ultimate in 486 Performance.

One reason to purchase a ZEOS is the product itself. ZEOS Upgradables are the ultimate high-performance 486 systems available now! What's more, our lower prices, Intel verification to the Pentium™ OverDrive™ Processor, and extra features such as double-speed CD-ROM drive, make these award-winning systems your best value.

The experts agree. In their January 1994 issue, *PC World* said: "The ZEOS 486DX2-66, with simply torrid performance, an outstanding price, and fine service, is (a)...Best Buy." There's more! Just listen to another expert, ***Windows Magazine***: "For a robust and upgradable high-performance system at an extremely competitive price, the ZEOS 486DX2-66 is an excellent choice."

To make it even easier on you, we give you everything you need now...and options for tomorrow. It's the right solution for your computing needs.

STANDARD WITH EVERY ZEOS UPGRADABLE SYSTEM	PACKAGE 1	PACKAGE 2	PACKAGE 3	PACKAGE 4
■ **Intel Verified:** for the Pentium™ OverDrive™ Processor. Zero Insertion Force (ZIF) socket makes upgrading easy.	**486SX-25 $1195** Lease $50/month	**486SX-25 $1495** Lease $63/month	**486SX-25 $1895** Lease $69/month	**486SX-25 $2295** Lease $83/month
■ RAM expandable to 64MB on the motherboard.	**486SX-33 $1295** Lease $55/month	**486SX-33 $1595** Lease $58/month	**486SX-33 $1995** Lease $72/month	**486SX-33 $2395** Lease $87/month
■ Two serial ports and one parallel port integrated on the motherboard.	**486DX-33 $1395** Lease $59/month	**486DX-33 $1695** Lease $61/month	**486DX-33 $2095** Lease $76/month	**486DX-33 $2495** Lease $90/month
■ Flash BIOS for easy upgradability.	**486DX2-50 $1495** Lease $63/month	**486DX2-50 $1795** Lease $65/month	**486DX2-50 $2195** Lease $79/month	**486DX2-50 $2595** Lease $94/month
■ Eight expansion slots: two VESA local bus, five 16-bit and one 8-bit.	**486DX2-66 $1695** Lease $61/month	**486DX2-66 $1995** Lease $72/month	**486DX2-66 $2395** Lease $87/month	**486DX2-66 $2795** Lease $101/month
■ ZEOS six-bay desktop case with two cooling fans for increased reliability and product life.	■ **Intel Verified:** for the Pentium™ OverDrive™ Processor	■ **Intel Verified:** for the Pentium™ OverDrive™ Processor	■ **Intel Verified:** for the Pentium™ OverDrive™ Processor	■ **Intel Verified:** for the Pentium™ OverDrive™ Processor
■ 200 watt power supply with built-in surge suppression; switchable between 115/230V.	■ 2MB high-speed RAM	■ 4MB high-speed RAM	■ 8MB high-speed RAM	■ 16MB high-speed RAM
■ Socket for inexpensive optional on-board SCSI.	■ 107MB local bus IDE hard drive with 32K cache	■ 214MB local bus IDE hard drive with 128K cache	■ 426MB, 13ms local bus IDE hard drive with 128K cache	■ 528MB, 12ms local bus IDE hard drive with 256K cache
■ Shadow RAM support.	■ 3.5" 1.44MB floppy drive	■ 3.5" 1.44MB floppy drive	■ **2X CD-ROM drive,** 3.5" 1.44MB floppy	■ **2X CD-ROM drive,** 3.5" 1.44MB floppy
■ ZEOS 101-key space-saving keyboard.	■ Diamond SpeedStar Pro Windows-accelerated local bus video with 1MB RAM. (16.7 million colors)	■ Diamond SpeedStar Pro Windows-accelerated local bus video with 1MB RAM. (16.7 million colors)	■ Diamond SpeedStar Pro Windows-accelerated local bus video with 1MB RAM. (16.7 million colors)	■ Diamond SpeedStar Pro Windows-accelerated local bus video with 1MB RAM. (16.7 million colors)
■ FCC Certified Class B; UL Listed.	■ ZEOS 14" 1024 x 768 NI SVGA color monitor, .28mm dot pitch	■ ZEOS 14" 1024 x 768 NI SVGA color monitor, .28mm dot pitch	■ ZEOS 14" 1024 x 768 NI SVGA color monitor, .28mm dot pitch	■ ZEOS 14" 1024 x 768 NI SVGA color monitor, .28mm dot pitch
■ Complete ZEOS Customer Satisfaction Package.	■ Microsoft DOS 6.2 with Enhanced Tools	■ Microsoft DOS 6.2 with Tools, Windows for Workgroups 3.11 & Microsoft Mouse	■ Microsoft DOS 6.2 with Tools, Windows for Workgroups 3.11 & Microsoft Mouse ■ Choice of Lotus Windows application	■ Microsoft DOS 6.2 with Tools, Windows for Workgroups 3.11 & Microsoft Mouse ■ Choice of Lotus Windows application

FAVORITE OPTIONS

426MB TO 528MB HDD UPGRADE **$125**

10-BAY VERTICAL CASE **$95**

ADAPTEC 6360 SCSI CONTROLLER CHIP
For on-board SCSI. Includes drivers **$49**

96/48/24 V.42 bis SEND/RECEIVE FAX MODEM **$79**

DIAMOND VIPER VIDEO CARD
1MB VRAM: **$149** .....2MB VRAM: **$249**

15-INCH MONITOR UPGRADE
SVGA non-interlaced, 1024 x 768, flat screen.....**$95**

LOTUS SMARTSUITE UPGRADE
Five Windows applications in one box! Lotus 1-2-3, Ami Pro, Approach, Freelance & Organizer.....**$299**

COMPLETE MULTIMEDIA PACKAGE
Double-speed, multisession, MPC-2 compliant CD-ROM. 16-bit/48KHz Cardinal Digital Sound Pro 16 Sound Card with Digital Signal Processor (Sound Blaster and Adlib compatible). Labtec Stereo speakers.....**$299**

Many other affordable upgrades and options available. Call for details!

FREE SOFTWARE

Packages 3 and 4 come with your choice of either Lotus Ami Pro, Freelance, 1-2-3, Improv, Organizer or hot new Approach.

yes
It runs with NetWare

NETWORK NEEDS *Add a network card to your 486, or if you need 32-bit data transfers on your network, ZEOS EISA systems are the right choice for you. Call for details.*

CALL NOW TOLL FREE
800-554-7172

ZEOS INTERNATIONAL LTD

2. ZEOS® Pantera™ The Fastest Thing Going!

It's Fast. It's Powerful. It's the ZEOS Pantera™–Your Best Pentium™ Processor Solution! Why the best? Because we offer you more performance, more high-tech innovative features and more models at an even more affordable price.

The Pantera motherboard, designed by ZEOS, takes advantage of the Pentium processor's advanced features and includes a hot new PCI Local Bus IDE Controller (supporting up to *four* IDE devices) built into the motherboard. The Pantera also features 3 PCI slots (one contains our incredible new PCI local bus video card) in addition to 5 ISA slots. (PCI delivers 32-bit data transfer at a rate up to 132MB per second!)

Also on the motherboard: integrated business audio and optional integrated SCSI. Plus, ZEOS is one of the first to give you write-back cache standard for the fastest caching scheme available.

To top it all off, we give you all these great features in several money-saving packages... or custom-build a system to your exact needs. So if you want the very best to run your mission-critical operations, the ZEOS Pantera is your best buy.

STANDARD WITH EVERY ZEOS PANTERA™ SYSTEM	PACKAGE 1	PACKAGE 2	PACKAGE 3	PACKAGE 4
	PANTERA 60 **$2495** Lease $90/month **PANTERA 66** **$2795** Lease $101/month	**PANTERA 60** **$2995** Lease $108/month **PANTERA 66** **$3295** Lease $109/month	**PANTERA 60** **$3395** Lease $115/month **PANTERA 66** **$3695** Lease $122/month	**PANTERA 60** **$3995** Lease $132/month **PANTERA 66** **$4295** Lease $142/month
■ Intel Pentium™ Processor running at 60MHz or 66MHz.	■ Intel Pentium Processor	■ Intel Pentium Processor	■ Intel Pentium Processor	■ Intel Pentium Processor
■ 256KB cache expandable to 512KB.	■ 4MB RAM	■ 8MB RAM	■ 12MB RAM	■ 16MB RAM
■ RAM expandable to 192MB on the motherboard.	■ 214MB local bus IDE hard drive with 32K cache	■ 340MB local bus IDE hard drive with 128K cache	■ 528MB local bus IDE hard drive with 128K cache	■ 1GB SCSI hard drive with 256K cache
■ Windows-accelerated PCI local bus SVGA color graphics card with 1MB RAM.	■ 3.5" 1.44MB floppy drive	■ **2X CD-ROM drive,** 3.5" 1.44MB floppy	■ **2X CD-ROM drive,** 3.5" 1.44MB floppy	■ On board Adaptec SCSI controller
■ Two high-speed serial ports and one enhanced parallel port on the motherboard.	■ Windows-accelerated PCI local bus SVGA color graphics card with 1MB RAM. (16.7 million colors)	■ Windows-accelerated PCI local bus SVGA color graphics card with 1MB RAM. (16.7 million colors)	■ Windows-accelerated PCI local bus SVGA color graphics card with 1MB RAM. (16.7 million colors)	■ **2X CD-ROM drive,** 3.5" 1.44MB floppy
■ Three PCI slots and five ISA slots.	■ ZEOS 14" 1024 x 768 non-interlaced SVGA color monitor, .28mm dot pitch	■ **ZEOS 15"** 1024 x 768 non-interlaced SVGA color monitor, .28mm dot pitch	■ **ZEOS 15"** 1024 x 768 non-interlaced SVGA color monitor, .28mm dot pitch	■ Windows-accelerated PCI local bus SVGA color graphics card with 1MB RAM. (16.7 million colors)
■ 12-bit ADPCM business audio integrated on the motherboard.	■ Six-bay desktop case with two cooling fans	■ **Ten-bay vertical case** with two cooling fans	■ **Ten-bay vertical case** with two cooling fans	■ **ZEOS 15"** 1024 x 768 non-interlaced SVGA color monitor, .28mm dot pitch
■ Socket for optional on-board Fast SCSI-2 support.	■ MS-DOS 6.2, Windows for Workgroups 3.11, Microsoft mouse	■ MS-DOS 6.2, Windows for Workgroups 3.11, Microsoft mouse	■ MS-DOS 6.2, Windows for Workgroups 3.11, Microsoft mouse	■ **Ten-bay vertical case** with two cooling fans
■ Flash BIOS for easy upgradability.		■ Choice of Lotus Windows application	■ Choice of Lotus Windows application	■ MS-DOS 6.2, Windows for Workgroups 3.11, Microsoft mouse
■ 200 watt power supply with built-in surge suppressor. Switchable between 115/230V.				■ Choice of Lotus Windows application
■ ZEOS 101-key space-saving keyboard.				
■ FCC Certified Class B; UL Listed.				
■ Complete ZEOS Customer Satisfaction Package.				

FAVORITE OPTIONS

340MB to 426MB HDD UPGRADE **$55**

ADAPTEC 6360 SCSI CONTROLLER CHIP
For on-board SCSI. **$49**

INTERNAL 14,400 bps V.32 bis MODEM WITH 14,400 bps SEND/RECEIVE FAX **$179**

1MB TO 2MB VIDEO RAM UPGRADE
Add additional memory for greater video performance **$59**

DIAMOND PCI VIPER VIDEO CARD WITH 2MB VRAM
Fastest Windows accelerated video **$249**

ARCHIVE SUPERHORNET INTERNAL TAPE BACKUP
80 to 250MB (with compression), includes backup software **$169**

MULTIMEDIA UPGRADE
If your system includes a CD-ROM drive, upgrade with a sound card and speakers **$148**

300 WATT POWER SUPPLY UPGRADE **$50**

MICROSOFT WINDOWS NT
A 32-bit high-performance operating system for client-server computing **$329**

LOTUS SMARTSUITE UPGRADE
Five Lotus applications in one bundle **$299**

Many other affordable upgrades and options available. Call for details!

SERVICE & RELIABILITY

ZEOS has won more *PC Magazine* Readers' Choice for Service & Reliability awards than any other company–five in all!

CALL NOW TOLL FREE

800-554-7172

ZEOS PENTIUM PROCESSOR SOURCE

Purchase orders are subject to approval. Business leasing programs available. All prices, specifications and availability are subject to change without notice, call to confirm these and warranty details. Prices do not include shipping. Novell compatibility is Developer Tested Only. Novell makes no warranties with respect to this product. All products and company names are trademarks or registered trademarks of their respective holders. Intel, Pentium and OverDrive are trademarks of Intel Corporation. ZEOS and Contenda are registered trademarks. Z-Card and Computers Now! are registered servicemarks. Ambra and Freestyle are trademarks of ZEOS International Ltd. ©1994 ZEOS International Ltd. 1301 Industrial Blvd., Minneapolis, MN 55413 USA. ZEOS is a publicly traded company (NASDAQ symbol: ZEOS). UPGR-PCM-9403A

1. ZEOS® Can Ship Today!

CALL FOR A COMPUTER OR A CATALOG.

We're offering you an advantage other companies can't. High-quality, affordable computers in many money-saving configurations (or the option to custom-build one to your exact needs). Sound familiar? It's not. We also give you award-winning service and toll-free support–24 hours a day, every day.

And there's more! If you order a *Computers Now!* system (samples are shown below) before 1 p.m., Monday-Friday, we'll ship it the day you order. If you'd like to see our complete line of ZEOS products and options, we'll send you a free catalog. Call 800-554-7172 now for your computer or your catalog.

486DX-33
$1695

PACKAGE #2:

- 4MB RAM
- 214MB local bus hard drive with built-in 128K cache
- 3.5" floppy drive
- Windows-accelerated local bus video
- SVGA color monitor
- DOS, Windows, Mouse

486DX-33
$2095

PACKAGE #3:

- 8MB RAM
- 426MB local bus hard drive with built-in 128K cache
- 2X CD-ROM drive, 3.5" floppy drive
- Windows-accelerated local bus video
- SVGA color monitor
- DOS, Windows, Mouse
- Choice of Windows application

486DX-33
$2243
486DX2-66
$2543

PACKAGE #3MM:

- 8MB high-speed RAM
- 426MB, 13ms local bus IDE hard drive with built-in 128K cache
- 2X CD-ROM drive, 3.5" floppy drive
- Cardinal Digital Sound Pro 16 card
- Magnetically shielded stereo speakers
- Windows-accelerated local bus video
- SVGA color monitor
- DOS, Windows, Mouse
- Choice of Lotus Windows application

486DX2-66
$2895

PACKAGE #3 BONUS:

- 8MB RAM
- 256K SRAM system cache
- 528MB local bus IDE hard drive
- 2X CD-ROM drive, 3.5" floppy drive
- Diamond Viper local bus video card
- 15" SVGA color monitor
- 14,400 bps V.32 bis send/receive fax modem
- DOS, Windows, Mouse
- Choice of Windows application

Pantera-60
$2995
Pantera-66
$3295

PACKAGE #4:

- Intel Pentium Processor
- 8MB RAM
- 340MB local bus IDE HDD with built-in 128K cache
- 2X CD-ROM drive, 3.5" floppy drive
- Windows-accelerated PCI local bus video
- 15" SVGA color monitor
- 10-bay vertical case
- DOS, Windows for Workgroups, Mouse
- Choice of Lotus application

Ambra™
486SX-25
$1195

PACKAGE #1:

- 4MB RAM
- 214MB hard drive with built-in 128K cache
- 3.5" floppy drive
- VESA local bus SVGA color video
- SVGA color monitor
- DOS, Windows, Mouse

Contenda®
386SL-25
$1344

PACKAGE #2 PLUS:

- 4MB RAM
- 80MB IDE hard drive
- External 3.5" floppy disk drive
- Internal 96/48/24 send/receive fax modem
- DOS, Windows for Workgroups
- Lotus Organizer
- 9.7" x 6.1"; 3.9 lbs.

Freestyle™
486SL-25
$2195

PACKAGE #3:

- 8MB RAM
- 260MB IDE hard drive
- Internal 96/24 send/receive fax modem
- Custom leather carrying case
- Extra battery
- External charging stand
- DOS, Windows for Workgroups
- 8.5" to 11.3" x 1.75" to 2.25"; 5.6 lbs.

OUR GUARANTEE TO YOU:

If we accept your order for immediate shipment and fail to ship your system under the conditions outlined, we will ship it *at our expense* as soon as it is ready.*

CALL NOW TOLL FREE
800-554-7172

ZEOS INTERNATIONAL, LTD.

Fax Orders: 612-633-1325. Government: 800-245-2449. Hearing Impaired (TDD): 800-228-5389. Outside U.S. and Canada: 612-633-6131. Purchase Orders, MasterCard, VISA, Am Ex, Discover, Z-Card,™ COD and affordable leasing programs. Open 24 Hours a Day, 365 Days a Year!

*Orders must be for Computers Now! configurations, we've listed just a sampling here. Since we continuously update this list of configurations, *please call to confirm your system is on the list.* This offer is good only as long as these pre-built systems remain in stock. Other ZEOS systems and custom configurations may take slightly longer—about a week. All orders are subject to credit approval. Orders must be received by 1 p.m. Central Time, M-F.

Circle 155 on reader service card

■ Monitors

Nanao's 21-Inch FlexScan: A Flicker-Freezing Wonder

BY TIN ALBANO

The FlexScan F780iW, Nanao's latest 21-inch monitor, can display images at resolutions as high as 1,600 by 1,200 pixels and at vertical refresh rates as flicker-freezing as 80 Hz. But the F780iW is as expensive as it is impressive at $3,999.

The F780iW isn't an everyday monitor, and it wasn't designed for typical business use. Nanao built the F780iW specifically for CAD, desktop publishing, and other graphically intensive work that requires the monitor to run at very high resolutions. Its 200-MHz bandwidth is extremely high and only syncs in the horizontal frequency range of 45 to 100 kHz. This means you can't simply plug this monitor into your average video card and expect it to run DOS because it won't sync at VGA resolution.

The F780iW is being bundled with a specially designed Matrox MGA Ultima Plus video card that can support the monitor's highest resolutions and refresh rates.

In our tests, which were performed at a resolution of 1,280-by-1,024, the F780iW turned in excellent overall results. It displayed a crisp image that popped right off the screen, and there were no noticable image defects.

The F780iW's pincushion measurement was especially good given the monitor's size, and the rest of the results were outstanding. The F780iW's modulation transfer function and misconvergence scores both easily surpassed ZD Labs' acceptable performance levels for 21-inch monitors. The unit's maximum usable brightness of 22.7 foot-lamberts is not as stellar as its other measurements, but ZD Labs considers anything above 20 foot-lamberts to be adequate for a 21-inch monitor.

HI-RES: *Nanao's FlexScan F780iW has a maximum resolution of 1,600 by 1,200 pixels at an 80-Hz refresh rate.*

(For a more in-depth explanation of exactly what image aspects each of these tests measures, see this issue's evaluation of 14- and 15-inch monitors. But don't compare the F780iW's performance results to those of the smaller monitors.)

STAMPS OF APPROVAL

Nanao has made sure that the F780iW complies with MPR II emissions standards and the FDA's Energy Star power conservation requirements. Both the ELF (extremely low frequency) and VLF (very low frequency) magnetic fields fall well within the MPR II guidelines for safe monitor emissions.

Like other Nanao displays, the F780iW monitor uses "screen blanking" to signal the monitor to enter its power-saving modes. The F780iW also supports VESA's DPMS specification to initiate power-down procedures. The monitor uses more power than average for fully white or fully black screens, but its power-saving modes use very little energy. (For more on MPR II, and Energy Star, see "Through the Looking Glass" in this issue.)

Nanao did not skimp when it put together the F780iW. The monitor is microprocessor-equipped and has a full complement of digital image-adjustment controls. Along with the standard adjustments for brightness and contrast, there are controls for pincushioning and other geometric-image distortions. Also included are a full set of color-adjustment controls.

The F780iW uses a 21-inch flat-square CRT design with a very fine 0.26-mm-dot-pitch shadow mask. Nanao's WideView feature allows the monitor to display an image from edge-to-edge both horizontally and vertically, eliminating the unused screen space between the image and bezel. The F780iW's screen is bonded with an antiglare coating that reduces the screen's tendency to reflect ambient light, thus increasing image sharpness and decreasing eyestrain.

Although Nanao's flagship 21-inch monitor was not designed for everday chores, hardcore graphics experts should be willing to pay the high price for the Nanao FlexScan F780iW's advanced luxuries.

• List price: *Nanao FlexScan F780iW, $3,999; with 2MB VRAM and special version of Matrox MGA Ultima Plus, $4,699; with 4MB VRAM, $4,999. Nanao USA Corp., 23535 Telo Ave., Torrance, CA 90505; 800-800-5202, 310-325-5202; fax, 310-530-1679.*

Circle 431 on reader service card

Benchmark Tests: Nanao FlexScan F780iW

ZD Labs

As a guide, we provide what we consider acceptable performance for a 21-inch monitor. The Nanao FlexScan F780iW produced excellent results on all our tests.

The power-consumption results for the FlexScan met the FDA's Energy Star requirements, and the monitor's magnetic field emissions fell well within the MPR II guidelines of 200 nanoteslas for ELF (extremely low frequency) emissions and 25 nT for VLF (very low frequency) emissions.

We used the MicroVision SuperSpot 100 to test for MTF (modulation transfer function), misconvergence, and pincushioning. We used a Minolta Color Analyzer CA-100 to measure the maximum usable brightness, a Dranetz 8000-2 Energy Analyzer to measure power consumption, and Combinova meters to measure the maximum ELF and VLF emissions.

	Average MTF ❶	Maximum Usable Brightness ❶	RMS Misconvergence ❷	Pincushioning ❷
Nanao FlexScan F780iW	55	22.7	3.3	3.0
Acceptable performance	49	20.0	n/a	n/a

❶ Higher scores represent better performance ❷ Lower scores represent better performance

POWER CONSUMPTION

VLF AND ELF EMISSIONS

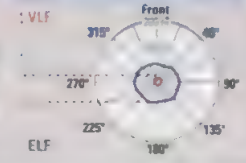
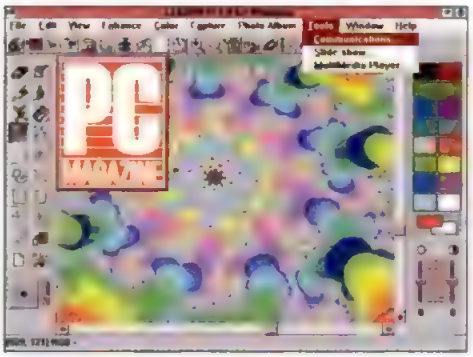


Image Processing

Leadview: Feature-Rich but Speed-Poor

BY J. W. OLSEN

Leadview 3.0 for Windows offers a broader set of image-processing tools than its peers, and it does so at an attractive introductory price of $99. If you don't mind a few rough edges and some slow going, you'll be hard-pressed to find more bang for your graphics-utility buck.



INTEGRATED: *Leadview 3.0 has a wide range of image-processing tools on its main screen.*

Leadview's screen real estate lets it house even more toolbars than HALO Desktop Imager or ImagePals, leaving minimal room for images. Fortunately, most of Leadview's tools can be suppressed.

Unlike its rivals, Leadview offers all its features in one integrated environment. There's screen capture, image display and enhancement, file-format conversion, printing, and scanner support. Like most Leadview services, capturing is highly flexible. Beyond the usual options, you can capture the menu under the cursor (great for software documentation), polygonals, bitmaps, and icons. You can then route these captures to the on-screen workspace, to the Windows Clipboard, or directly to a disk or printer.

Image-enhancement tools are plentiful, but since Leadview supports only 20 formats, its file conversion pales when compared with that of HiJaak PRO for Windows or Conversion Artist. The most prevalent formats are supported, though, and Leadview's proprietary .CMP format yields great compression without using the "lossy" techniques of other high-compression algorithms. Leadview's "slide shows" give you rich options for displaying multiple images and sounds. It supports .AVI, MIDI, and .WAV formats.

Leadview has batch-mode file conversion, and it ships with a "photo album" feature to manage collections of related images. While these albums are similar to those found in other programs, they execute from the main program, a decided advantage.

Leadview's main shortcoming is speed. In informal testing, it took more than twice as long as its slowest competitor to load a 200K .GIF file (163 seconds, compared with HiJaak PRO's 72 seconds). At the other extreme, ImagePals and Paint Shop Pro loaded the same file in 27 seconds. Image editing can also be painfully slow.

With its rough edges polished, Leadview could become a top-tier offering. For now, though, its wealth of features and low introductory price make it attractive only for occasional graphics tasks.

• List price: *Leadview 3.0 for Windows, $99. Requires: 2MB RAM, 8MB hard disk space, Microsoft Windows 3.1. LEAD Technologies Inc., 8701 Mallard Creek Rd., Charlotte, NC 28262; 800-637-4699, 704-549-5532; fax, 704-548-8161.*

Circle 419 on reader service

FIRST LOOKS PLUS

From February 28 through March 4, you can go on-line to download the Leadview viewer and sample files or to discuss the program with J.W. Olsen and Lead Technologies CEO Rich Little. Type GO EXEC from any CompuServe ! prompt.

Reference

Columbia's Quotations Add Wit to Your Work

BY MELISSA J. PERENSON

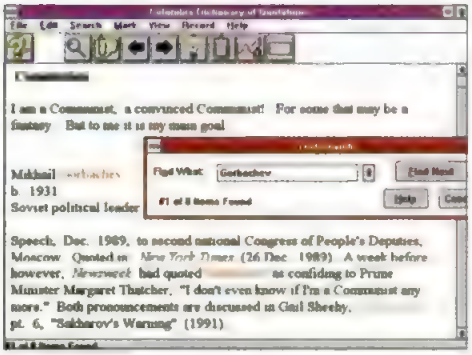
"To be apt in quotation is a splendid and dangerous gift. Splendid, because it ornaments a man's speech with other men's jewels; dangerous, for the same reason."—Robertson Davies, 1960.

You can enhance your own writings with the aid of The Columbia Dictionary of Quotations ($89.95), a valuable resource whose impressive scope overshadows a weak interface to earn a spot in your electronic reference collection.

All of the 18,123 entries are fully annotated, and many describe a quote's original context. Aside from tapping the traditional wells of information, Columbia draws from such disparate sources as French semiologist Roland Barthes, film critic Pauline Kael, author Lewis Carroll, and political gadfly Ross Perot.

This electronic volume comprises entries culled from the unabridged text of the 1993 edition of *The Columbia Dictionary of Quotations* (which includes 11,000 never-before-published quotations). It gives you a speedy search mechanism to seek out sayings and excerpts from famous speeches with ease, and you can export the text to any Windows application via the Clipboard. You can mark and move up to 50 entries at a time.

The search mechanism is, simultaneously, the best and worst aspect of the program. There are eight different ways to search through the contents, including by author, subject, quote excerpt, source, and author's life span. The text-search option uses Boolean operators AND, OR, and NOT to streamline searches.



IN CONTEXT: *Not only do you get quotations, you also get a brief history of their origins.*

But the search mechanism's interface is a rigid, awkwardly sized box that tends to get in the way of reading the text. Unfortunately, you can't simply shift the box off to the side, because then you lose access to the forward/backward buttons used in conjunction with the search window. Aside from this one annoyance—and the noticeable lack of a print option—the interface is simple to navigate.

• List price: *The Columbia Dictionary of Quotations, $89.95. Requires: 2MB RAM, 5.5MB hard disk space, Microsoft Windows 3.1. Aapex Software Corp., 952 Greg St., #101, Sparks, NV 89431; 800-728-7650, 702-324-4580; fax, 702-324-4578.*

Circle 420 on reader service card

THE WORLDWIDE DATABASE STANDARD

Let dBASE cut two hours out of your work day

Get more done faster when you upgrade to dBASE IV v2.0

PC Magazine calls new dBASE IV® version 2.0 "the new speed demon."

And for good reason. Version 2.0 is up to ten times faster than version 1.5 and dBASE III PLUS.® In fact, some tasks are hundreds of times faster—even on networks. And a recent usability study[1] proved that users get their work done 25% faster with dBASE IV v2.0 than with FoxPro v2.5. That's like getting an extra two hours out of an eight-hour day.

Support for DOS and UNIX

Like earlier versions of dBASE,® new v2.0 is designed for use by both users and programmers. Everything is 100% compatible with earlier dBASE IV and dBASE III PLUS versions, so you won't have to worry about data conversion or learning a new program.

And because dBASE IV v2.0 supports both DOS and UNIX,[2] it's the perfect database for organizations that use both operating systems. You can even copy DOS data and application files to UNIX without modification.

Both platforms feature identical visual design tools that let you create database tables, queries, forms, and reports onscreen. You also get high-productivity development facilities that dramatically cut application programming time.

Add more speed with 100% compatible dBASE Compiler

dBASE Compiler for DOS[3] is the only compiler that is 100% compatible with dBASE IV and dBASE III PLUS. With new 32-bit support, your custom applications will run up to 200% faster. Rev it up even more with an Intel OverDrive™ Processor.[4]

So don't let another minute slip by. Order dBASE IV v2.0 and dBASE Compiler today.

Special Upgrade Offer for dBASE owners
dBASE IV v2.0 for DOS: $99.95
dBASE IV v2.0 for UNIX: $199.95

Special Introductory Offer—everyone qualifies!
dBASE Compiler v2.0 $199.95

90-day, money-back guarantee!

See your dealer or call now, 1-800-336-6464, ext. 8056

In Canada call, 1-800-461-3327.

Borland
Power made easy™

1 Usability Science Corporation, dBASE IV v2.0 vs. FoxPro v2.5, June 1993. 2 dBASE IV for UNIX sold separately. 3 dBASE Compiler for DOS sold separately 4 See special offer in dBASE Compiler box or call Intel at 1-800-538-3373, ext. 249 for a free demo diskette Prices good in the United States and Canada only. All prices are in U.S. dollars. Dealer prices may vary. Copyright © 1993 Borland International, Inc. All rights reserved. All product names are trademarks of their respective companies. BI 6429.1

CIRCLE 220 ON READER SERVICE CARD

■ Accounting

Mondial: Mighty Accounting Muscle for $199

BY KATHY YAKAL

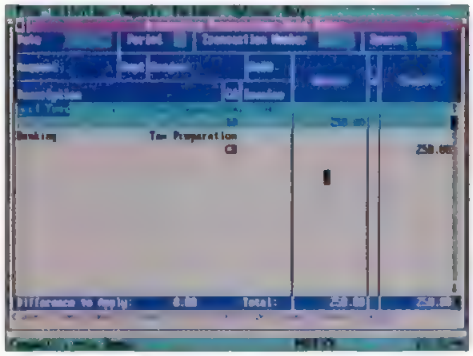
Four years ago, M-USA Business Systems made news when it delivered Pacioli 2000, a multimodule accounting program, for $49. The company is attempting a similar coup with Mondial, a DOS-based accounting package that has more sheer accounting functionality than any product in its price range ($199; $99.95 for the additional Payroll module). This first release, however, is somewhat clunky.

Mondial is marred by a serious flaw in its help system (expected to be corrected by the time you read this), slow speed, and incomplete documentation, but M-USA has basically accomplished what it set out to do. Mondial may be overkill if your small business accounting needs are uncomplicated and its complexity may make it unsuitable for accounting novices, but its depth can't be matched by any product at this price.

Mondial's menu structure is deceptive: It's very abbreviated, and organized by function rather than module. Within, though, lies the ability to process transactions via standard accounting modules: General Ledger, Accounts Receivable and Payable, and Inventory. Not often found in this price range are its Order Entry, Point of Sale, Assembly Control, Job Costing, and Purchase Order modules, and an iron-clad audit trail. Network-ready out of the box, Mondial has another unusual capability, especially appropriate in light of the recent NAFTA agreement: multi-currency conversion.

EASY SETUP

Despite its formidable processing power, the program's design does incorporate elements to simplify setup and data entry. For instance, 23 sample Charts of Accounts come pre-built, and data files can be imported in ASCII, Pacioli 2000, and Quicken's .QIF format. You can build master files at the start or add them on the fly. You can choose between two styles of data entry, depending on your level of accounting savvy. To record transactions outside of the routine purchase, sales, and checks procedures, you can use the Account Register (a less complex entry system) or Transaction Entry (a double-entry system that requires more hands-on work with debits and credits). Recurring transactions can be memorized and recalled. You can search for transactions and reconcile virtually any account.

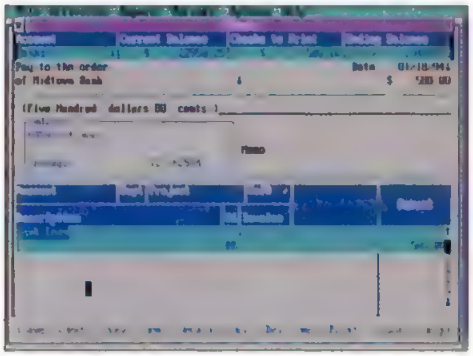


TRANSACTIONS: *You use this data entry screen to enter both sides of a transaction.*

Most modules have more flexibility and features than other low-end programs. For example, the General Ledger handles up to 36 open periods. Inventory gives you a choice of five different costing methods—Average Cost, Standard Cost, LIFO, FIFO, or Last Purchase Price—and allows drop shipments, assembly control ("kitting"), and unlimited warehouses. Accounts Payable alerts you to discounts available. Point of Sale supports an unlimited number of checkout stations. Unlimited Ship-To addresses can be stored for customer billing. Budgets can be set for more than one year at a time, and Accounts Receivable supports both open invoice and balance forward systems.

Mondial uses standard fill-in-the-blank forms, pull-down menus, dialog boxes, and "pick lists" for data entry. Context-sensitive help is available and, like the documentation, is spotty in terms of its thoroughness. Worse, on-line help didn't perform well in the version of Mondial we tested; every time we tried to use it, the program crashed and closed.

Nine levels of password security can be assigned to users. And since only one person on a network can access a file or account at one time, Mondial incorporates an unusual timer feature: Set the timer to 5 minutes, and once the current user goes 5 minutes without activity, the system opens up to other users.



CHECKING: *Filling out a check in Mondial is as simple as it is in a personal finance program.*

M-USA has struck a compromise in its error-correction procedures that should please both novice users and financial professionals. While transactions can be edited and deleted, records of all such events are stored in journals. And if you need to reverse a transaction, you simply call it up and click on the Reverse button.

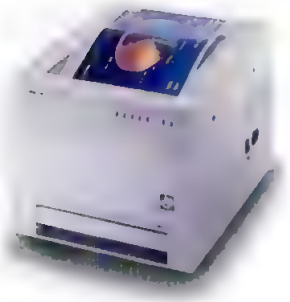
EASY OUTPUT

Mondial's output is certainly adequate, offering dozens of customizable standard reports—like Budget vs. Actual, Cash Flow, Trial Balance—that can be printed to the screen, printer, a file, or exported as ASCII. Its financial report writer, a handy tool for users who want to design their own reports, is much simpler to use than those of other programs. Rather than having to deal with a page full of X's and O's and other foreign characters, you're walked through the creation process and asked specific questions whose answers define various sections of the report. Checks, invoices, purchase orders, and other forms can be printed on M-USA's preprinted forms or, in some cases, on plain paper.

If you don't need a good percentage of the features offered by Mondial, it's probably not your best choice for small business accounting. It's not the most intuitive program around, and it's a little unstable in this first release. But if you do need these features, and you're a little patient, there's nothing like it at the price.

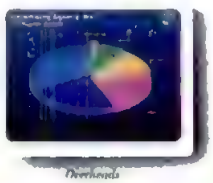
• List price: *Mondial 1.0, $199.95.* Requires: *640K RAM, 4MB hard disk space, DOS 3.3 or later. M-USA Business Systems Inc., 15806 Midway Rd., Dallas, TX 75244; 800-933-6872, 214-386-6100; fax, 214-404-1957.*

Circle 427 on reader service card



Science has found a cure for snoring. At least during your presentation.

It's the new Phaser™ 220 color printer by Tektronix.® It's affordable. It's easy to use. And it's the best way to keep people awake without the use of costly stimulants. How? Quite simply, amazing color. The Phaser 220's SuperCell 600™ technology allows you to print a whopping 600 x 300 dots-per-inch. And in lay terms, that's a lotta dots. And a lotta dots means your annual reports will yodel, your pie charts will do backflips and your bar graphs will announce their presence with authority. Plus you get all this great color at two pages per minute on most common laser papers. At this speed, it should come with an airbag. The Phaser 220 also offers true Adobe® PostScript™ Level 2 and supports PCs, Macs, workstations and just about every network interconnect. Add to this the fact that it's reliable, has multiple paper trays and a huge print capacity and you've got yourself one tough workhorse. For a free Phaser 220 print sample or the name of your nearest Tektronix dealer, call 800/835-6100, department 34E. For faxed information, call 503/682-7450, and ask for document #5003. But don't wait too long. Because business is getting more and more competitive. And if you snooze, you lose.



The Phaser 200 series starts at a suggested retail price of only $2,995. Who says money can't buy happiness?

Tektronix

Phaser is a trademark of Tektronix, Inc. PostScript is a trademark of Adobe Systems, Inc. All other marks are trademarks or registered trademarks of their respective companies

CIRCLE 001 ON READER SERVICE CARD

Morphing

MorphWizard 1.0: Tougher To Use Than Competitors

BY JOHN R. QUAIN

If you morph it, will they come? Given the array of morphing software now available for Windows, more than a few software companies think so (see First Looks, October 26, 1993).

ImageWare's $149 MorphWizard 1.0 does much of what other morphing products do, letting you take two graphic images and create a third composed of elements of the first two. You can also create animated effects showing one image smoothly transforming into another.

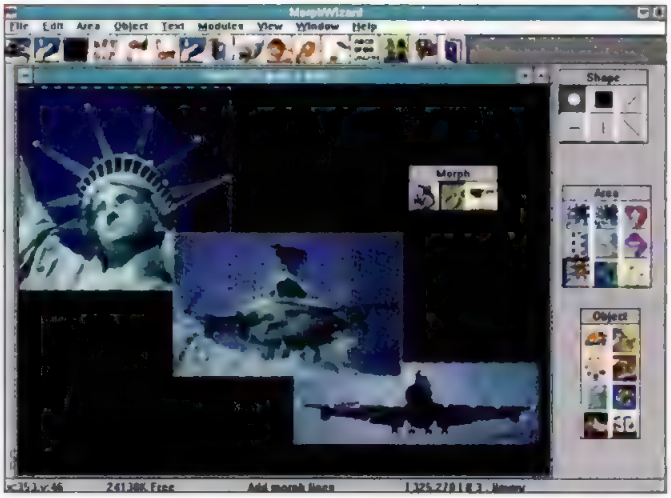
To perform such feats of graphical magic, MorphWizard uses 24-bit color images in a wide variety of popular file formats, including .BMP, .CMP, .GIF, JPEG, .PCX, .RLE, Targa, and TIFF.

Creating a morph always takes skill, but of the morphing programs we've seen to date, MorphWizard is one of the most difficult to use. Since the program is object-based, it first requires that you store an area from an image as an object. Then you load the objects you want to morph into a new window. Anchor points are selected one at a time in one image using one mouse button, and adjusted in the second using the other mouse button. Once you've set the points, you still have to go back and trace morph lines to connect the points.

To create an animated morph, you then have to move to MorphWizard's "movie" utilities. The awkward but adaptable movie utilities let you combine backgrounds and animated objects with morphs. You can add titles, and transition effects include fades, wipes, and dissolves. Animations can be stored in either Windows' .AVI or Autodesk's .FLC file format.

The printed documentation tells you plenty about hardware and system settings, but it isn't much help when it comes to creating actual morphs. That task is left up to an animated on-line help program complete with sound effects. Unfortunately, it glosses over a few of the finer points, making initial sessions needlessly frustrating.

Although comparably priced with other Windows morphing programs, MorphWizard works better as an add-in software module for the company's graphics editor, ImageWizard. When it comes to standalone morphing, most users will find other programs easier to use.



MOVIETIME: *MorphWizard can animate morphs and add effects.*

- List price: *MorphWizard, Version 1.0, $149.* Requires: *4MB RAM, 11MB hard disk space, Windows 3.1. ImageWare Software Inc., 15373 Innovation Dr., San Diego, CA 92128; 800-842-4199, 619-673-8600; fax, 619-673-1770.*

Circle 430 on reader service card

Communications

QmodemPro Does Windows Well

BY EARLE ROBINSON

With a powerful new Basic-like script language and built-in fax support, the $139 QmodemPro for Windows enters a crowded Windows communications market. Mustang Software is counting on the justifiably excellent reputation of DOS versions of Qmodem to get the attention of Windows users.

QmodemPro for Windows is the first communications program to offer support for the Remote Imaging Protocol (RIP), which lets you view good-looking graphical screens when you dial into bulletin boards that run RIP-compliant software.

The program has excellent modem compatibility and even offers expert advice. When we installed the software with a Practical Peripherals portable modem, a screen popped up to tell us that the modem works best with ROM Version 1.12c or later and said this should be verified. The installation is polite enough to ask permission to change the modem parameters, too. There is support for COM1 through COM9, and for INT14.

QmodemPro supports the major file-transfer protocols, including all the flavors of X-modem, as well as CompuServe B Plus, Kermit, and Zmodem. It can also send and receive faxes with Class 1 or Class 2 fax modems and view faxes with the included viewer. You can't keep a log of the faxes you send, and the faxes can only be text or .PCX files. The program logs incoming faxes, but only summarily. A built-in .GIF file viewer is handy, and you can use it to see images as they are downloading.

DIAL UP: *Qmodem's dialer is icon-based.*

The new script language uses Basic's syntax. It's accompanied by a full manual explaining details of scripting. The auto-learn is helpful; even necessary, since there are no canned scripts for services like CompuServe or MCI. The scripts you create are compiled, and if you are careful, you will hide or remove the uncompiled versions since passwords are visible in them. The debug facility is a valuable tool, too.

- List price: *QmodemPro for Windows, Version 1.0, $139; upgrade, $50.* Requires: *4MB RAM, 15MB hard disk space, Windows 3.1. Mustang Software Inc., P.O. Box 2264, Bakersfield, CA 93303; 800-999-9619, 805-873-2500; fax, 805-873-2599.*

Circle 428 on reader service card

AVOID DELAYS GETTING TO WORK.

Don't waste precious time. Use Sony QD2120 formatted QIC-80 data cartridges. The perfect shortcut for your QIC-80 drive.* Saving you up to two hours of formatting time for more productive pursuits. Like backing up your critical data. To keep your PC system running on schedule, take the quick route. For more data, just call 201-476-8199.

ONLY ON SONY DATA MEDIA

SONY

CIRCLE 377 ON READER SERVICE CARD

© 1993 Sony Electronics Inc. Reproduction in whole or in part without written permission is prohibited. All rights reserved. Sony and Only On Sony are trademarks of Sony. *QIC-80 drives from Colorado Memory Systems, Conner Peripherals, Iomega, Summit Memory Systems and Wangtek.

Disk Utilities

SpinRite 3.1 Delves Deep Into Your Disks

BY WINN L. ROSCH

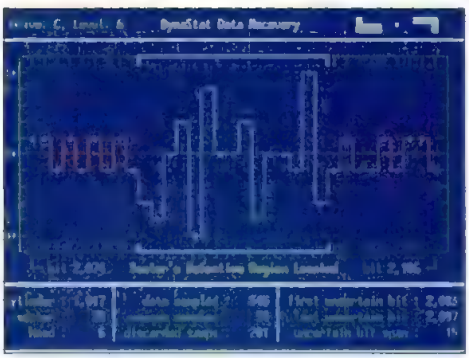
Once a tool to make good disks better, SpinRite 3.1 from Gibson Research moves into a new role: helping make bad disks better. While the $129 disk utility retains most of its old features, this latest incarnation is simplified in structure, compatible with compressed disks, and more effective at recovering data from injured disks.

The new SpinRite is possibly the most powerful end-user disk-analysis tool available because it deduces the data coding scheme used by your hard disk and picks the most demanding magnetic flux patterns with which to test. With an admittedly bad test disk, it flagged about 15 percent (7,651 versus 6,595) more sectors as bad than DOS FORMAT or other disk utilities, keeping marginal sectors off limits. Moreover, SpinRite 3.1 logs the errors it locates by head and sector so you can see what's gone wrong.

When SpinRite 3.1 finds that you have data on a bad sector, it recovers most of the information. Using a combination process called "Dynastat," SpinRite tries a variety of low-level hardware-controlled techniques—rereading the disk every spin, altering the head angle, and so on—to pull bits from the bad sector.

SpinRite 3.1 also helps fix one of the most common and perplexing disk problems: CMOS disk setup errors. It guesses your disk configuration and warns when your CMOS parameters don't match.

SpinRite cannot rejuvenate the low-level formats of embedded-servo IDE and SCSI hard disks. Unlike general disk-utility packages, SpinRite doesn't unerase files, recover directories, unformat disks, or let you edit your disk's directories or file allocation table.



ANALYSIS: *SpinRite has high-end tools.*

Although the compact 74K program is fast, it can be bothersome to use because it's incompatible with software caches, multitasking systems, and some device drivers. SpinRite 3.1 requires you to boot "clean" from a floppy disk. Although that penalty is minor if your hard disk has crashed, it's irksome when you just want to fix a floppy disk.

Disasters won't wait. With SpinRite 3.1 finally available, you no longer have to wait to recover from them.

- List price: *SpinRite, Version 3.1, $129; $89 (direct through March 31, 1994); upgrade, $29.* Requires: *350K RAM, DOS 2.1 or later. Gibson Research Corp., 35 Journey, Aliso Viejo, CA 92656; 800-736-0637, 714-362-8800; fax, 714-362-8808.*

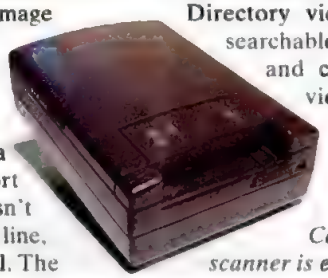
Circle 429 on reader service card

Business Card Scanners

CardGrabber Uses Parallel Port for Easier Connection

BY NEIL J. RUBENKING

Pacific Crest's $349 CardGrabber joins the growing field of business-card scanning solutions. Like the three previously reviewed in First Looks (December 7, 1993), it scans business cards directly into a database, doing its best to convert the card's image to text and match the text to fields.



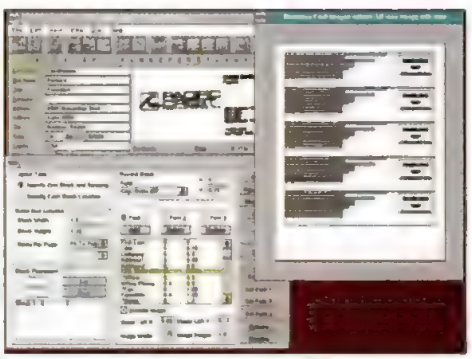
SHARP CARD: *CardGrabber's scanner is easy to install.*

Since CardGrabber's exclusive scanner uses a simple parallel-port interface, it doesn't need a slot, an IRQ line, or a DMA channel. The database features advanced import/export and printing.

The database's 25 fields include two complete addresses, five types of phone numbers, and two additional phone fields that double as e-mail addresses. It also stores a zoomable card image.

You can create and save search filters based on user-defined categories, date ranges, and partial field values, though you cannot search for text within the 30K free-form comment field. You can switch to the Directory view to see a searchable list of names and companies or view 4, 6, or 16 card images at once.

Import and export are handled via Microsoft's Open Database Connectivity (ODBC) drivers. If not already present, CardGrabber installs ODBC and drivers for dBASE, Excel, Paradox, and text formats. These drivers, along with predefined field mappings, let CardGrabber exchange files with Access, ACT!, Ascend, dBASE, Lotus Organizer, PackRat, Paradox, and Telemagic.



SMOOTH SETUP: *CardGrabber's print layout editor lets you control placement and font for each field, and preview the result.*

To add another format, you install the appropriate ODBC driver and create a field mapping in CardGrabber. Predefined layouts for printed output include address book, Day-Runner, envelope, and Rolodex. The impressive print layout editor controls the font and position of every output field.

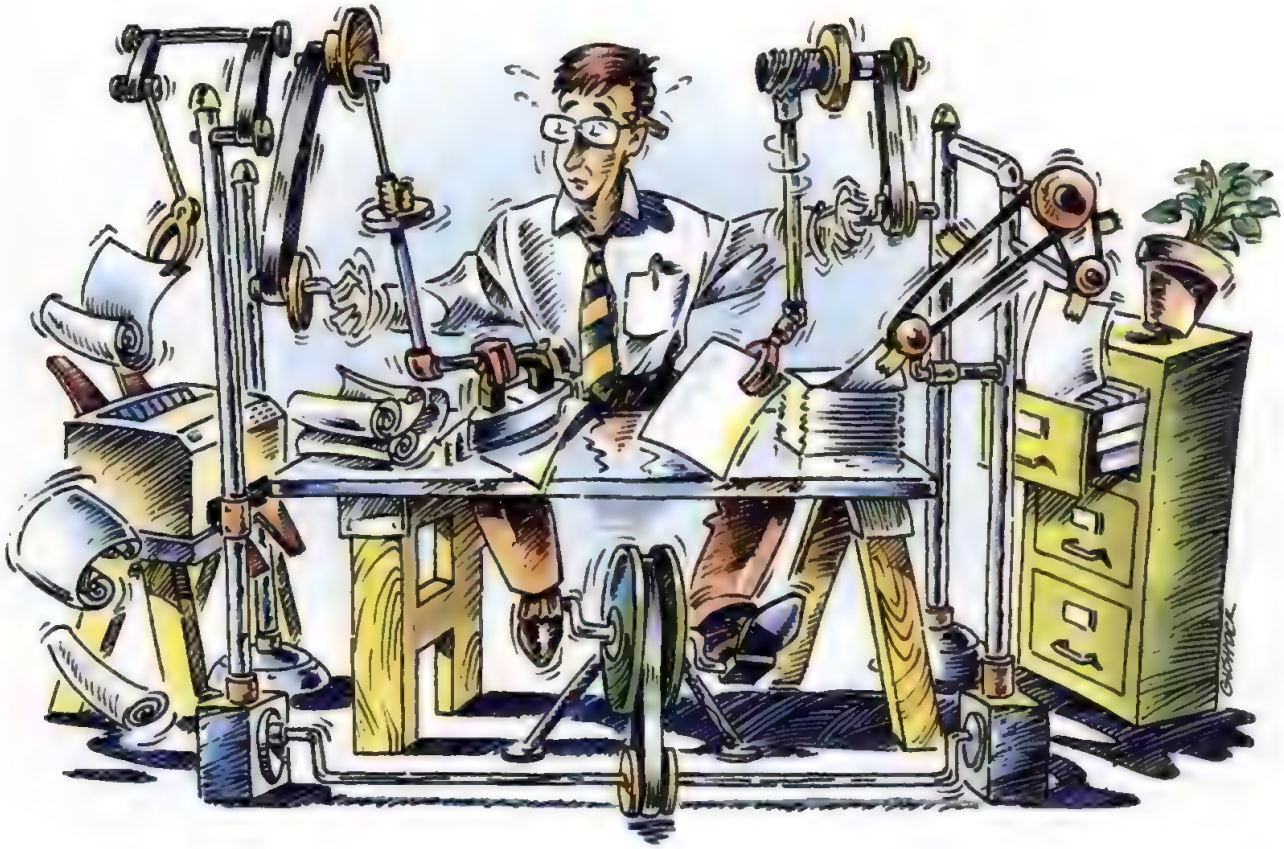
Context-sensitive help, batch processing, and recognition of foreign addresses didn't make it into Version 1.0, and the program has a few quirks. Scanning a black card can crash it, though without damaging the database.

CardGrabber's reporting and data-sharing are exemplary, and the parallel-port interface makes it the best solution for laptop users.

- List price: *CardGrabber, Version 1.0, $349.* Requires: *2MB RAM, 4MB recommended), 5MB hard disk space; Windows 3.1 or later. Pacific Crest Technologies Inc., 4000 MacArthur Blvd., #6800, Newport Beach, CA 92660; 800-870-3391, 714-261-6444; fax, 714-261-6468.*

Circle 422 on reader service card

You too can build your own alternative to Fax and Find.



Sure, as long as you don't mind pedaling all day. But for those who want to solve their fax, paper document, and electronic file management problems in real time without breaking a sweat, there's Fax and Find,™ from Caere.

Fax and Find integrates the best-selling Windows™ fax software, WinFax PRO,™ with the leading document management program, Personal PageKeeper,™ in one easy-to-use solution. So now you can not only manage your faxes, but also automatically index, organize, and retrieve information from scanned documents and other files on your hard drive. Anything else is just spinning your wheels.

Call us today at **1-800-535-SCAN** for the name of your nearest Caere dealer or for more information about Fax and Find.

caere

For Your Information.

Caere is a registered trademark of Caere Corporation. Caere logo, Personal PageKeeper, and Fax and Find are trademarks of Caere Corporation. WinFax PRO is a trademark of Delrina (Canada) Corporation. Windows is a trademark of Microsoft Corporation. ©1993 Caere Corporation. All rights reserved.

CIRCLE 292 ON READER SERVICE CARD

HP quality in a low-price PC.

- *Intel 25- and 33-MHz 486SX; 33-MHz 486DX; 66-MHz 486DX2*
- *Chip upgrades to higher performance*
- *Four mass storage shelves*
- *Four 16-bit ISA expansion slots*
- *170-MB hard drive[1]*
- *4-MB RAM, expandable to 32-MB*

HP Vectra 486VL

- *Optional 128-KB cache memory*
- *On-board accelerated local-bus 1024 x 768 video*
- *512-KB Video RAM, expandable to 1-MB*
- *EPA Energy Star certified on some models*
- *Optional MPC-2 CD/Audio Bundle*
- *Free three-year limited warranty for parts and labor[2]*

from
$1,149†

Complete client PC solutions for connected offices.

- *Intel 25-MHz 486SX and 33-MHz 486DX*
- *ZIF socket for upgrade to Pentium™ Overdrive[3]*
- *4-MB RAM, expandable to 48-MB*
- *170-MB hard drive[1]*
- *Two mass storage shelves; three ISA slots*
- *Ultra VGA accelerated local-bus 1024 x 768 video*

HP Vectra 486NI

- *Integrated 16-bit 10Base-T networking*
- *Boot-ROM for leading network operating systems*
- *Flash EPROM*
- *Multilevel security*
- *Systems Diagnostics Utility*
- *EPA Energy Star certified*
- *Automatic setup*
- *Free three-year limited warranty for parts and labor[2]*

from
$1,359†

The best-value 486 PCs for business.

- *Intel 25- and 33-MHz 486SX; 33-MHz 486DX and 66-MHz 486DX2*
- *ZIF socket for upgrade to Pentium™ Overdrive[3]*
- *4- or 8-MB RAM, expandable to 48-MB*
- *170-MB hard drive[1]*
- *Four mass storage shelves; four ISA slots*
- *Flash EPROM*

HP Vectra 486M

- *Ultra VGA accelerated local-bus 1024 x 768 video*
- *512-KB Video RAM, expandable to 1-MB*
- *Systems Diagnostics Utility*
- *Automatic setup*
- *Optional integrated 10Base-T networking*
- *Optional Client Management Bundle*
- *Free three-year limited warranty for parts and labor[2]*

from
$1,479†

Powerful PCs for advanced business communications.

- *Intel 33-MHz 486DX; 50- and 66-MHz 486DX2*
- *ZIF socket for upgrade to Pentium™ Overdrive[3]*
- *8-MB RAM, upgradable to 64-MB*
- *240-MB IDE hard drive[1]*
- *128- or 256-KB second level write-back cache*
- *New Ultra VGA2 local-bus 1280 x 1024 video*

HP Vectra 486XM

- *1-MB Video RAM, expandable to 2-MB*
- *Integrated 16-bit 10Base-T networking*
- *System BIOS, Video BIOS and setup in Flash EPROM*
- *SIR Infrared port standard to link HP mobile products*
- *Free three-year limited warranty for parts and labor[2]*

from
$2,359†

yes NetWare Tested and Approved

† List price, dealer prices may vary. Monitor not included [1] Other capacities available. [2] First year on-site, 24-hour service. Second and third year return to dealer. [3] When available from Intel. [4] MS-DOS® 6.0 and MS Windows™ 3.1, pre-installed; HP mouse and keyboard included. MS-DOS is a U.S. registered trademark and Windows is a trademark of Microsoft Corporation. Pentium and Intel Inside logo are U.S. trademarks of Intel Corporation. ©1994 Hewlett-Packard Company PPG400

intel inside

The short list for volume buyers with a long list of expectations.

Check your * before you buy.

Did you know that all 3-year warranties aren't created equal? Just check their fine print and you'll find qualifiers, restrictions and exclusions. Check our asterisk and all you'll find is good news.

	HP	Compaq	IBM	AST
Free 3-year warranty covers entire product line.	X*	X		
Free 1-year on-site service implemented by manufacturer.**	X*		X	X
Free 3-year warranty covers monitors when purchased with any system.	X*			

*Covers all HP Vectra PC products. Always.

**For a nominal fee, the 1-year on-site service can be upgraded to 3-year on-site service.

Other free end-user support:

Automated response line, 24 hrs/day, 7 days/week:	800•333•1917
Technical support phone line:	303•635•1000
HP FIRST FAX services:	800•333•1917
HP Forum on CompuServe:	800•848•8990
The Electronic Bulletin Board:	408•553•3500

When you add HP to your short list, you're adding more than just another vendor. You're adding peace of mind.

Our affordable, high-performance PCs come with a whole laundry list of features.* But the features that distinguish these PCs from all others won't be found on any spec sheet. They're the reliability and assurance you get from HP standing behind every product they make. Imagine that. No risk. No gamble. No wonder BIS Strategic Decisions has called HP "the fastest-growing PC company in the U.S." Call 1-800-322-HPPC for more information or for the Hewlett-Packard dealer nearest you.

HEWLETT® PACKARD

Primavera Project Planner®

Project management software that's so powerful,

Introducing the power to see everything more clearly. To understand what's happening. And to control every detail of the project. Primavera Project Planner for Windows™ is powerful new software, capable of handling the toughest projects, especially in a

SO multiuser, multiple project environment.

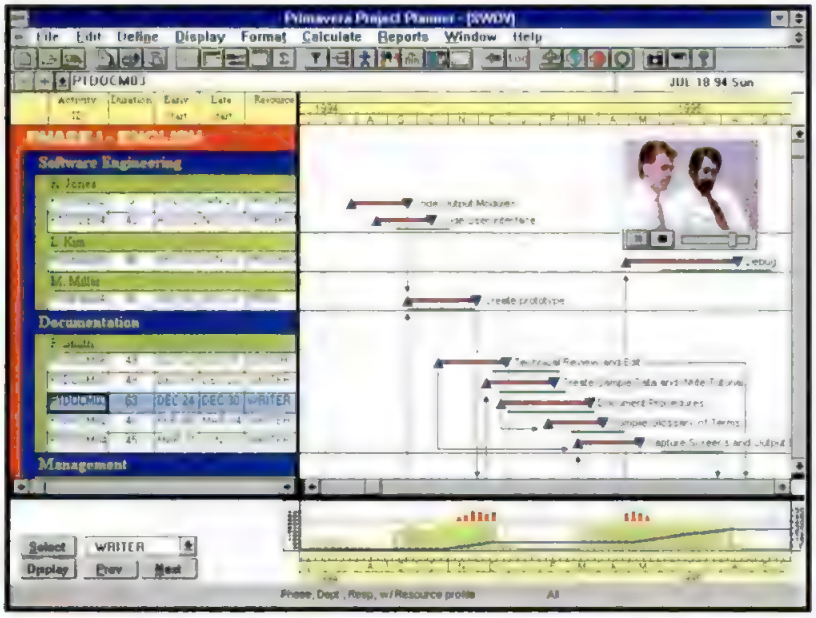
persuasive,

Now you can communicate clearly, dramatically and professionally with information-rich reports and graphics. Primavera makes it easy to get your point across whether you're talking in

SO the board room, the lab, the plant or on the job site.

insightful,

Primavera gives you unlimited ways to analyze your project. You can even organize and summarize by resources and WBS. You'll know the who, what, when, why and how much—and keep your project under control.



MICROSOFT WINDOWS COMPATIBLE

Primavera Project Planner gives you unlimited ways to organize and format project information for better on-screen analysis and reporting. No other software uses Windows better for the project manager. Primavera takes full advantage of Windows functionality including drag and drop, Object Linking and Embedding, and more.

FREE!
Primavera-in-action video.
Call 1-800-423-0245!

Windows is a trademark of Microsoft Corporation

you'll wonder how you lived without it.

Primavera for Windows will give you what project managers want most. Results. For more information, call 1-800-423-0245.

PRIMAVERA

How the world says project management

Two Bala Plaza • Bala Cynwyd, PA 19004
(215) 667-8600 • FAX: (215) 667-7894

CIRCLE 148 ON READER SERVICE CARD

Experience P3® for Windows hands-on!
Call 1-800-423-0245 for the Test Drive nearest you.

New & Improved

NEWS OF ANNOUNCED PRODUCTS AND UPGRADES

By Anush Yegyazarian

IMPROVED

Improving Communications Software Bit by Bit

Bit Software has added voice capabilities to Version 3.0 of its BitFax Professional for Windows. The program can now automatically distinguish between incoming fax, data, and voice communications. It also offers WYSIWIG faxing from any Windows application, fax forwarding, and drag-and-drop faxing, and lets you add graphics to your faxes with a floating toolbox. The Receive Manager feature also has automatic fax compression built in. Fax scheduling, cover pages, mail-merges, and compatibility with dBASE files are all standard. AnyFax OCR, BitCom, and BitScan are bundled with the product. The software also supports Twain-compatible scanners and DDE.

• List price: *BitFax Professional 3.0 for Windows, $129. Bit Software Inc., 47987 Fremont Blvd., Fremont, CA 94538; 510-490-2928; fax, 510-490-9490.*

Circle 402 on reader service card

IMPROVED

The WinBook's Back—With an Intel CPU

Micro Electronics' WinBook notebook PCs now have Intel SL–enhanced CPUs rather than Cyrix processors. When we last saw the WinBook (August 1993), we liked the system's reasonable price and Powerbook-like trackball mounted below the keyboard. Now you can choose among 486SX/25 and 486DX/33 models in both monochrome and dual-scan passive-matrix screens, with an increased memory limit of 32MB and optional 340MB hard disks. The standard configuration includes 4MB of RAM, a 200MB hard disk, a 2,400-/9,600-bps data/fax modem, and one PCMCIA Type II slot. Battery life ranges from 5 to 6 hours. Monochrome models weigh 5.4 pounds; color models weigh 5.9 pounds with battery.

• List price: *WinBook 486SX/25, $1,599 to $1,999; WinBook 486DX/33, $1,998 to $2,799. Micro Electronics, 1160 Steelwood Rd., Columbus, OH 43212; 800-468-2162, 614-481-7460; fax, 800-448-0308.*

Circle 414 on reader service card

HOT PROSPECT

Everything Your Office Needs—In One Package

Are you looking for one machine from which you can do all your faxing, printing, copying, scanning—and even computing? **QMS** has an answer: the QMS 2001 Knowledge System.

The system is available either as an attachment to your existing computer or as a full 486-based PC. The attachment, which has 2MB of RAM expandable to 10MB, consists of a 6-page-per-minute laser printer, a sheet-fed scanner and copier (all three handle resolutions of 400 dots per inch), and an OCR-compatible, 9,600-bps fax modem. The scanner supports .BMP, .PCX, TIFF, and .ZGF file formats, and the fax modem has direct faxing for ASCII, .DCX, .PCX, and TIFF files. A letter-size tray is included, and a legal-size tray is optional. The PC version offers 4MB of RAM standard, an 80MB hard disk, a 3.5-inch floppy disk drive, and a Super VGA monitor. There are also four ISA expansion slots.

The unit is software-based, so it can be upgraded as newer technologies like video conferencing and voice recognition become more necessary.

The 2001 Knowledge System will probably best serve those who need to save space or who don't want to integrate four or five different peripherals and resolve compatibility problems.

• List price: *QMS 2001 Knowledge System, $3,999; Knowledge System PC, $6,500. QMS Inc., One Magnum Pass, Mobile, AL 36689; 800-523-2696, 205-633-4300; fax, 205-633-0013.*

Circle 401 on reader service card

IMPROVED

Designworks Emigrates From the U.K.

GST Software, a British-based company, has released the newest version of its drawing and illustration software in the U.S. Designworks 2 for Windows now lets you create custom shapes such as starbursts, add text directly on the page with familiar desktop publishing tools such as kerning, and mix custom colors in finger-painting style. It ships with 84 typefaces and supports OLE 2.0, 24-bit color, and up to 200 layers within a document.

Designworks 2 lets you create custom shapes and enter text directly on the page.

• List price: *Designworks 2, $199.95. GST Software, 3336 Hemlock Dr., Falls Church, VA 22042; 800-236-1062, 703-560-2354; fax, 703-560-2672.*

Circle 404 on reader service card

IMPROVED

The Next Step for Statgraphics

Manugistics has released Statgraphics for DOS, Version 7; Statgraphics Plus for DOS, Version 7; and Statgraphics Plus for Windows, the first Windows version of its statistical graphics analysis software.

Statgraphics for DOS 7 features experimental-design support for mixture models and a matrix procedure that can create a matrix from existing variables or break up a matrix into its components; it can also calculate nonparametric capability indices when data doesn't follow normal distributions. It ranks all possible regressions and shows a table of summary statistics. Version 7 has improvements such as a full-screen macro

Photography by Thom O'Connor

editor, the ability to set the number of runs for a macro, and support for importing files from Excel and Lotus 1-2-3.

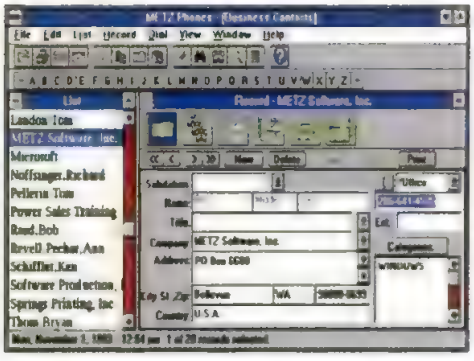
Statgraphics Plus for Windows is broken up into a basic model with the most commonly used features (simple and multiple regression, multivariable analyses, and others), and add-on modules for more specialized functions. The basic model also lets you save an analysis for later use and modification, or add graphics.

• List price: *Statgraphics for DOS, Version 7, $995; Statgraphics Plus for DOS, Version 7, $1,595; Statgraphics Plus for Windows (basic), $649; modules, $399 each. Manugistics Inc., 2115 E. Jefferson St., Rockville, MD 20852; 800-592-0050, 301-984-5000; fax, 301-984-5094.*
Circle 405 on reader service card

IMPROVED

Share Your Phonebook With METZ Phones

METZ Software has released METZ Phones 5.0, an upgrade to its phone management software. This version has network features that let you share your phonebook database with others on your network, allowing multiple users to access the information at the same time. You can store multiple addresses and unlimited phone numbers, and there's a dialing hotkey that lets you dial numbers from within any Windows app. There are predefined formats for printing reports, envelopes, and labels in the software, and you can import data



METZ Phones 5.0 helps you organize your contacts and share them across a LAN.

from .DBF, .WKx, .XLS, and other file formats. It's compatible with LAN Manager, NetWare, Pathworks, PC LAN, VINES, and Windows for Workgroups. A trial version is available on CompuServe and America OnLine.

• List price: *METZ Phones 5.0, $49 until April 30, $89 thereafter; upgrade, $29. Metz Software Inc., P.O. Box 6699, Bellevue, WA 98008; 800-447-1712, 206-641-4525; fax, 206-644-6062.*
Circle 406 on reader service card

BRIEFS

HARDWARE

Epson America has launched a new 24-pin impact printer, the $299 ActionPrinter 3260. It is color-upgradable by the user, has a standard 50-page cut-sheet feeder, and includes ten built-in fonts. It prints at 216 characters per second. The color upgrade kit is $49. 800-289-3776, 310-782-0770.

SOUND CARDS

The Cyber Audio/SRS is the result of the joint effort between **SRS Labs** and **Alpha Systems Lab**. This software-upgradable sound card has SRS 3-D sound and some voice recognition capability. It uses ARIA synthesized sound, DSP architecture, and wave-table synthesis. The Cyber Audio/SRS can record and play back at 44.1 KHz with 10-bit recording and 16-bit playback. It is available in three models: without speech recognition ($200), with a 50-word vocabulary ($249), and as a full board with a 125-word vocabulary ($299). The two lower-end models have 512K of RAM sampling; the full board has 1MB. 800-576-4275, 714-252-0117.

Multiwave Innovation is offering its 3-D sound card, the $299 Audiowave Platinum 16, with 8- and 16-bit mono and stereo recording and playback from 5 to 48 KHz. It includes CD-ROM and MIDI interfaces, a headphone or amplifier port, and two independent DMA channels, and is compatible with most major compression and decompression algorhithms. A SCSI adapter board and wave-table synthesizer module are available as upgrades. 408-379-2900.

The $250 Soniq Sound, **Best Data Product**'s 32-bit sound card offering, uses wave-table technology and is MIDI compatible. It has CD-ROM, joystick, and MIDI interfaces and can record and play back 16-bit sound at 44 1 KHz. 800-632-2378, 818-773-9600

Turtle Beach Systems has released five new audio cards. The first is the $249 Rio Professional MIDI Synthesizer Module. It has a WaveFront chip set, 4MB of ROM with 32 voices of 16-bit MIDI compatible instruments, and 256K of sampling RAM expandable to 4MB.

NEW

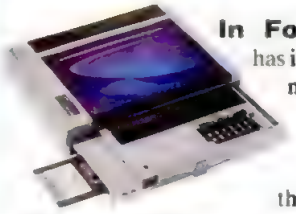
Browsing at Turbo Power

Pacific Gold Coast Corp. has released Turbo Browser 3.1, a file viewer for Windows files. Browser lets you preview thumbnail video and animation clips, graphics images, and sound bites. An auto-play mode lets you sit back and watch as Browser goes through your files. File-management features let you copy, save, convert, delete, and print files—and even add audiovisual associations to them. Browser has file compression and supports .AVI, .GIF, JPEG, .MID, .PCX, .WAV, and TIFF formats.

• List price: *Turbo Browser, Version 3.1, $69. Pacific Gold Coast Corp., 15 Glen St., Glen Cove, NY 11542; 800-732-3002, 516-759-3011; fax, 516-759-3014.*
Circle 408 on reader service card

NEW

Focusing on Brilliant Projections



The PanelBook 530.

In Focus Systems has introduced two new models to its line of projection panels: the compact LitePro 540 and the smaller, notebook-size PanelBook 530.

The LitePro 540 weighs 19 pounds and can project up to a 15-foot screen image. It uses an active-matrix screen with 640-by-480 resolution and a 400-watt halogen lamp that provides a brightness of 150 lumens. A customizable button on the Smart Remote lets you program your most common commands.

At 5.5 pounds, the PanelBook 530 is lighter than the LitePro 540, but like the LitePro, it has an active-matrix screen with 640-by-480 resolution and the Smart Remote. It is used with an overhead projector and supports full-motion video.

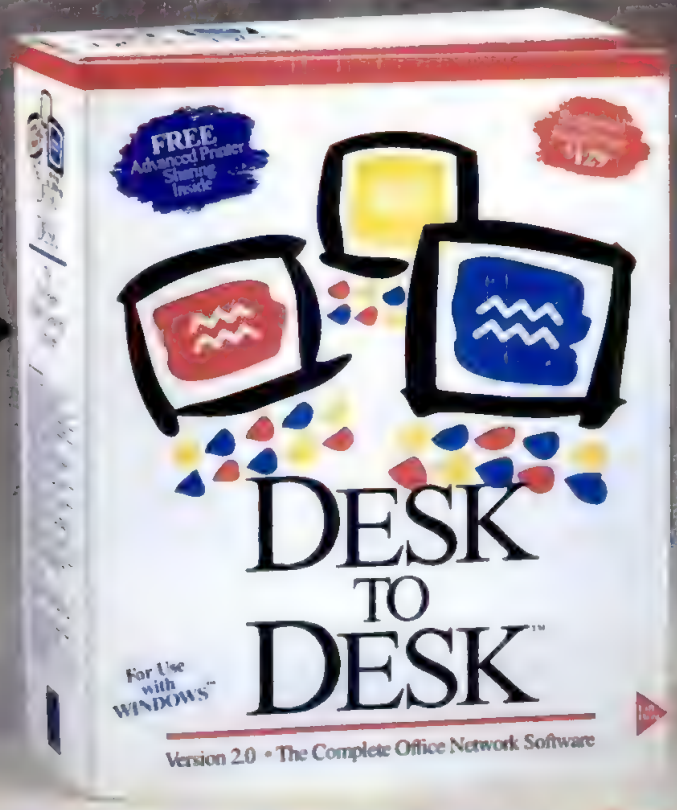
The LitePro 540

The LiteShow II presentation manager, which can store your presentation (and let you leave your PC home), is available with both units, adding $1,000 to the price of the LitePro and $750 to the PanelBook.

• List price: *LitePro 540, $7,499; PanelBook 530, $4,799. In Focus Systems Inc., 7770 SW Mohawk St., Tualatin, OR 97062; 800-294-6400, 503-692-4968; fax, 503-692-4476.*
Circle 409 on reader service card

Go Ahead... Add Network Users. See If We Care!

For:
Ethernet
Token Ring
ARCnet



255-User Peer-to-Peer LAN. $129. Period.

	Desk to Desk	Windows™ for Workgroups	LANtastic™
Price:*			
2 User	$129	$199.90	$238
5 User	$129	$399.95	$595
20 User	$129	$1,599.80	$2,378
255 User	$129	$20,397.45	$2,999

*Prices are accurate at time of printing and are for comparative use only

DESK TO DESK™, the most powerful and easiest-to-use peer-to-peer LAN for business consumers, lets you network up to 255 users for a single price of $129. It's the only LAN that opens up your office, not your wallet.

Unlike other networks, with DESK TO DESK you never again pay to add PCs to your network as your small office, home office or corporate department grows. And with a full 30-day no-questions-asked money-back guarantee, you can't go wrong.

DESK TO DESK...all you expect in networking and more...for less.

	Desk to Desk	Windows™ for Workgroups	LANtastic™
Windows or DOS?	Both	Windows only	Both
Disk Space Req'd	89K - 3MB	14.5MB	2MB
Online Manual	Yes	No	No
Network-wide Printer Control	Yes	No	Yes
Complete File Sharing	Yes	Yes	Yes
Password Security	Yes	Yes	Yes
CD-ROM Sharing	Yes	Yes	Yes

800/835-DESK

Call today to order DESK TO DESK, or ask your local software retailer.

©1993 CBIS, Inc. Desk to Desk, the Desk to Desk logo and Complete Office Network are trademarks of CBIS, Inc. All other trademarks are the property of their respective owners.

DESK TO DESK

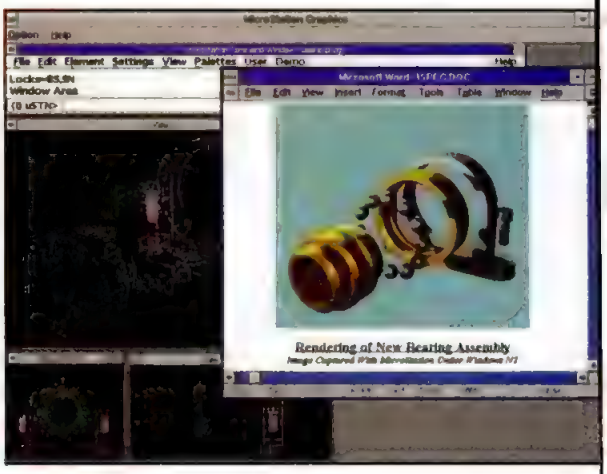
The Complete Office Network™ Software

CIRCLE 094 ON READER SERVICE CARD

CADVANCE, ClarisCAD, VersaCAD, MacBravo! users ...

TRADE UP to MicroStation

Trade requires proof of purchase. $1,500 until June 30, 1994. Price good in U.S. only.



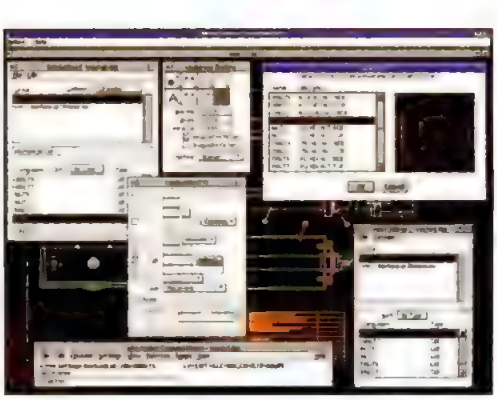
Rendering. *Visualization and flythroughs – at your fingertips! MicroStation offers photo-realistic rendering to every designer, right in the software. It's easy to make your image reflect your imagination.*

Windows. *It walks and talks Windows. Behind MicroStation lies the user-responsive programming you look for in good Windows software. Version 5 gives you the ultimate in integration of CAD, engineering, and business applications.*

MORE POWER TO YOU.

Modeling. *Model any surface you can imagine in MicroStation. NURBS surface modeling combined with 3D Boolean operations gives you astounding flexibility in creating and modifying freeform models.*

Read & write AutoCAD .dwg

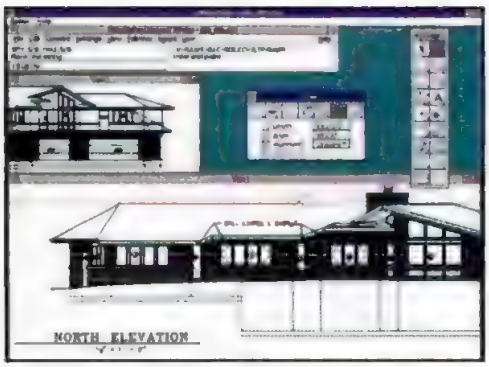


Workspaces. *Choose the design environment that matches your profession or your CAD expertise – even AutoCAD. Complete with custom interfaces, drafting styles, and design environment management. CAD has never been so streamlined!*

Drafting. *MicroStation gives you first-rate drafting pow – without the limitations of old technology. Enjoy the advantage of contemporary features like as ciative patterning/batching, plot preview, standard text editing a fonts, and context-sensitive Hypertext help.*

O
mas
Mo
point.

Intergraph® is a registered trademark of Intergraph Corporation. MicroStation® is a registered trademark of Bentley Systems Inc., an Intergraph affiliate. Other brands and product names are trademarks of their respective owners. Copyright 1993 Intergraph Corporation, Huntsville, AL 35894-0001. DDAD13780



Usability. *What does computer-aided drafting have to do with the way you think? Everything. MicroStation software works for you. It understands the drafting process so well that it infers what you'll do next.*

Power. *Take your pick of popular environments: DOS, Mac, Windows, Windows NT, or UNIX. Have a look at MicroStation on Intergraph's Technical Desktop Series personal workstations.*

Graphical User Interface. MicroStation's easy-to-use interface includes pull-down menus, dialog boxes, tear-off tool palettes, and tool settings window. Choose your interface – Windows or Motif – on any platform. *Transparent Modeless Operation.* The software supports the way you naturally work, maintaining command execution while you fine tune: change element attributes or command parameters, manipulate views, change the dimensioning system, and more. *Powerful View Manipulation.* MicroStation supports up to eight active views that can be moved, sized, and overlapped to fit your design. Zoom and area at any scale. Move around your design fast with built-in dynamic panning. *Workspace Editor.* Tailor pull-down menus, dialog boxes, and tool palettes – even disable commands – with a graphically oriented toolset for customizing your chosen interface. *Text Capabilities.* A convenient text editor lets you easily edit single-line or paragraph text. Choose from TrueType, PostScript, AutoCAD SHX, and MicroStation fonts. ASCII text files can be imported and exported. *Multiple Undo/Redo Commands.* Undo mistakes and perform "what-if" designs in a flash with unlimited undo and redo. *Plotting.* Plot raster and vector information by view or defined areas, at any scale. Visually preview the plot before plotting, saving time and materials. *Online HELP.* MicroStation's HELP remains active, tracking the command you're currently using, so there's no searching through manuals for assistance. *Associative Patterning and Hatching.* Associate patterning with graphics. Change graphics and the patterning updates. Flood-fill hatching/patterning intelligently fills an area, detecting boundaries and holes with a single pick. *Associative Dimensioning.* Dimensions are associated with the geometry, not with a point in space, so that when you change the geometry, the dimensions automatically update. *Custom Line Styles.* Create space-saving custom line styles and place railroad tracks, trees, isobars – anything – just as you would place a line. *Multi-lines.* Define line string elements comprising up to 16 parallel lines of varying symbology and store them in a style library recall. Architects can use multi-lines for fast and easy placement and intersection cleanup of walls and partitions. *2D Boolean ons.* Quickly modify, measure, and hatch multiple 2D shapes with integrated Boolean operations. *Mass Properties.* Calculate area and es of your model: surface area, volume, mass, centroid, moments and products of inertia, principal moments and directions, and radii of gyration. *S.* Define relationships among graphic entities with intuitive drawing modes such as tangent, parallel, perpendicular, midpoint, intersection, and end-*nsion-driven Symbols.* Based on established relationsh s, you can assign variables to dimensioned graphics and save the graphics as cells

MicroStation V5. CAD software that puts you in charge.

Call 800-345-4856 for a free brochure on MicroStation Version 5 and the name of an Intergraph representative in your area.

MicroStation
INTERGRAPH

CIRCLE 048 ON READER SERVICE CARD

NEW

Tektronix Heats Up More Color

The Phaser 220i and Phaser 220e are **Tektronix**'s newest additions to its 220-color thermal wax transfer printer line. Both printers have a resolution of 600-by300-dots per inch and can print at 2 pages per minute. They come standard with dual trays (one for paper, the other for transparencies) as well as with parallel, serial, and AppleTalk ports. Both support HPGL, HP PCL 5, Adobe PostScript 2, and TrueType fonts. Built-in NetWare and Apple's EtherTalk are available for $695 each; TCP/IP support costs $295 more.

The Phaser 220i: Tektronix's latest color thermal wax transfer unit.

The 220i has 10MB of RAM expandable to 14MB, 39 Adobe Type I fonts, and three HP PCL fonts. An internal hard disk is also an option for this printer. The 220e has 8MB of RAM, and 17 Adobe Type I fonts expandable to 39 fonts.

• List price: *Tektronix Phaser 220i, $5,995; Tektronix Phaser 220e, $3,995. Tektronix Inc., 26600 SW Pkwy., Wilsonville, OR 97070; 800-835-6100, 503-682-7377; fax, 503-682-7450.*
Circle 407 on reader service card

NEW

Retrieving Data, Wang Style

Getting data from a database can be more difficult than putting it in. To ease matters, a newly energized **Wang Laboratories** has released OPEN/query builder, a querying tool that works with a number of popular databases like dBASE, Microsoft SQL Server, Oracle Server, and Sybase SQL Server. Because it works with so many different types of databases, you have to learn only one interface to access your information.

It uses ODBC (Open Database Connectivity) and a step-by-step, graphical approach to querying with prompts for the necessary information at each step of the search. No knowledge of SQL queries is required. The software also lets you store your query, integrate the results via DDE links in a number of Windows applications, or send them through mail packages like Lotus's cc:Mail or Microsoft Mail.

• List price: *OPEN/query builder, $395 (standard), $99 (introductory). Wang Laboratories Inc., One Industrial Ave., Lowell, MA 01851; 800-639-9264, 508-459-5000; fax, 508-967-1125.*
Circle 410 on reader service card

BRIEFS

SOUND CARDS

Second is the newest Tahiti Digital Audio Card ($399). It lacks a synthesizer but since it is Creative Labs Wave Blaster–compatible, you can add one later. It has two tracks of 16-bit recording and Turtle Beach's Hurricane Architecture. The third upgraded offering is the $399 MultiSound Monterey, which has the same RAM sampling as the Tahiti but adds a 32-voice WaveFront playback synthesizer, patch editor, Wave SV sample editor software, and MousePlayer software. Fourth is the $199 Audio Advantage, a PCMCIA Type II sound card with 12-bit mono capabilities between 5.5 and 44.1 KHz. It includes a MIDI port and a 12-bit digital/analog converter. Last is the $199 Maui Wavetable Synthesizer Upgrade card, which has 16-bit sampled instruments in 2MB of ROM, 256K of sample RAM expandable to 8MB, a SampleStore player, and is MPU-401–compatible. 800-645-5640, 717-767-0200.

SOFTWARE

Velocity Development has released a fun new reminder program, the $49.95 Remind Me! It uses Looney Tunes characters such as Daffy Duck and Wile E. Coyote to deliver the messages. Users can program their messages, set features like time, snooze, and recurring event, and select the character that will deliver the message. 800-856-2489, 415-776-8000.

The Pet Advisor, $59.95 from **Pets & Computers**, is a new DOS program developed by a veterinarian to give dog owners health information about their pets. It includes a discussion of first aid, lists poisons and toxins, stores your pet's medical records, and offers information on the most common pet emergencies, among other things. 419-843-2797.

BILLING & SCHEDULING SOFTWARE

Responsive Time Logger, $139, is **Responsive Software**'s newest customizable time-tracking and -recording software for Windows. It lets you start and stop recording time and enter data about billable tasks with a few mouse clicks, allows you pause if you are inter-

NEW

Free Spreadsheet, Database, and Development Tool

On Top Systems is shipping 100,000 free copies (at a cost of $9.95 for shipping and handling) of DI-OGIX, Version 3.0D, a spreadsheet product with relational-database capabilities that also lets you create standalone applications. Spreadsheet features include edit fields, turnkey data entry forms, and report writing. The software can also read ASCII, Btrieve, .DBF, and .WKS files and can be ported to Unix. If you receive a free copy, you can upgrade to DI-OGIX ImageBase, which lets you incorporate images into your database, for an additional $39.95. NetWare and Unix versions are available.

• List price: *DI-OGIX, Version 3.0D, free to the first 100,000 users; $99.95 thereafter. On Top Systems Inc., P.O. Box 676, Northbrook, IL 60065; 800-454-4426, 708-291-0212; fax, 800-454-4490.*
Circle 411 on reader service card

NEW

Two Ways to Work Your Notes

Reach Software Corp. and **Action Technologies** have each released workflow tools that add onto Lotus Notes.

Reach Software is offering WorkMAN for Lotus Notes. WorkMAN has a WorkMAP tool that presents all parts of the workflow model—roles, links, forms—graphically so that you can workflow-enable Notes applications without using macros. An active workflow engine notifies users of tasks proactively, and dynamic form presentation lets developers create forms tailored for individual users. Central administrative functions help supervisors change personnel listings and access, as well as modify and distribute forms. Workflow applications are stored with the Notes database and can also be routinely distributed and maintained.

Action's answer to workflow is ActionWorkflow System for Lotus Notes. ActionWorkflow has an object-oriented architecture that allows you to build workflow applications without macros. The system has three add-on parts: Manager, Analyst, and Application Builder. The Manager supports all levels of transactions; it uses the Notes database or a Sybase SQL Server database to monitor the status of transactions and directories, notifies users of tasks, and checks for data integrity. The Analyst examines the workflow in your organization and helps you optimize it. The Application Builder modifies routing, roles,

Power Packed Upgrades.

POWER SUPPLIES

"The premier power-supply maker"
John Dvorak, *PC Magazine*, March 30, 1993
"The only company to go to for a power supply"
Jerry Pournelle, *Byte*, April 1993

STANDARD UNITS

These UL/CSA approved, fully tested power supplies are the best basic units available.

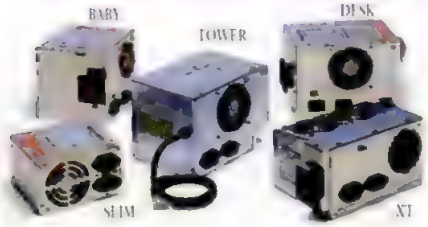
STANDARD 205 SLIM $89
STANDARD 220 DESK/TOWER $89

ULTRA-QUIET UNITS

Unrattle your nerves with an ultra-quiet **Silencer** power supply. Appreciated by users **since 1986**, their high-efficiency fans and low-turbulence circuitry reduce noise by up to 84%! A must for home office or *multimedia* applications.

SILENCER 205 SLIM $119
SILENCER 220 DESK/TOWER $129
SILENCER 270 DESK/TOWER $179

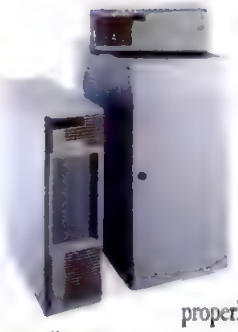
HIGH-PERFORMANCE UNITS



Upgrade your computer with one of our premium **Turbo-Cool** power supplies—the choice of PC professionals. You'll get 50% - 100% more power, built-in line conditioning, super-tight regulation, ultra-clean output, a high-capacity cooling fan, UL/CSA/TUV, a 2-year warranty for 300W models, and a **5-year warranty** for the 450! Ideal for high-end workstations and network file servers.

TURBO-COOL 300 SLIM/BABY $169
TURBO-COOL 300 DESK/TOWER ... $189
TURBO-COOL 450 DESK/TOWER ... $349

SOLID-STEEL CASES



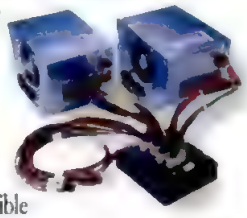
Give your computer a professional, high-tech look with one of our premium-quality, **USA-made,** all-steel cases. They're rigid—unlike light-weight imports—so the PC's components are always properly aligned and grounded. You'll enjoy easy system access, and with room for up to **18 drives,** there's real expandability!

	Desktop	Tower	Monster
Exposed Drive Bays:	5	6	13
Total Drive Bays:	7	8	18
Motherboard Capacity:	1	1	2
Power Supply Capacity:	1	1	2
Cooling Fan Capacity:	2	3	6
Filtered Air Inlet:	Yes	Yes	Yes
Lockable Front Door:	Yes	No	Yes
Beige or Black Finish:	Yes	Yes	Yes
Meets FCC-B Specs	Yes	Yes	Yes
Made in USA	Yes	Yes	Yes

SOLID-STEEL DESKTOP CASE..... $175
SOLID-STEEL TOWER CASE $295
SOLID-STEEL MONSTER CASE..... $895

REDUNDANT POWER

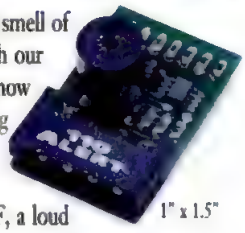
Eliminate the risk of network downtime or data loss due to power supply failure with the **TwinPower 900** redundant power system. It delivers high-capacity, fault-tolerant power to your entire network server. Consists of two **Turbo-Cool 450** power supplies in parallel, utilizing a special power-management interface module. A must for *mission critical* LANs.



- 900 watts peak power
- 100 X more reliable than a single-unit
- load-sharing design
- hot-swap capability
- 5-year warranty
- monster-case compatible

TWIN-POWER 900 ..... $995

OVER-TEMP ALARM

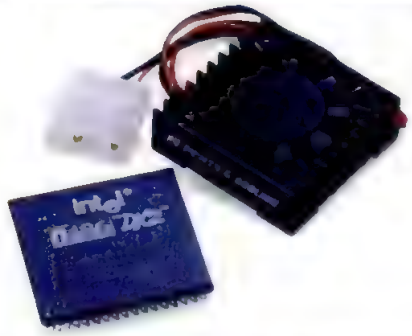


1" x 1.5"

Don't wait for the acrid smell of burnt components! With our new **110 Alert,** you'll know if your PC is overheating *before* damage occurs. Should the computer's temperature reach 110°F, a loud alarm warns you that a fan has failed or that the cooling system is inadequate to handle that extra hard drive or other peripheral you may have added. Compatible with any computer, the inexpensive **110 Alert** is compact, easy to install, and so reliable, it carries a lifetime warranty.

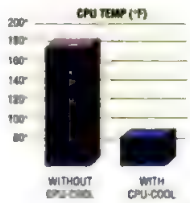
110 ALERT $29

CPU COOLERS



It's a fact. 486 chips run hot, often exceeding 185°F! Now, you can cool your 486 to a safe 85°-95°F with our popular **CPU-Cool.** It prevents random system errors and other heat-related problems. Consists of a mini-fan embedded in a die-cast heat sink that easily mounts on the CPU. Powered by a spare drive connector. Effective, inexpensive insurance!

- cools CPU 70° - 100°F
- prevents system errors
- adds years to CPU life
- thinner, quieter, and better-built than cheap imported imitations.
- safe, simple installation



CPU-COOL (FOR 486s) **$29**
PENTACOOL (FOR PENTIUMs) **$39**

PC POWER & COOLING, INC.
5995 Avenida Encinas, Carlsbad, CA 92008 • (619) 931-5700 • (800) 722-6555 • Fax (619) 931-6988

We accept Visa, MC, COD, or PO on approved credit. Warranty period: Five years for Twin Power and Turbo-Cool 450. Two years for Turbo-Cool (except 450), Silencer, and CPU coolers. One year for all others (except 110 Alert). Hours: 7 a.m. - 5 p.m. (PT) Mon. - Fri. Silencer, Turbo-Cool, TwinPower, CPU-Cool, PentaCool, and 110 Alert are trademarks or registered trademarks of PC Power & Cooling, Inc. ©1993 PC Power & Cooling, Inc.

CIRCLE 080 ON READER SERVICE CARD

and forms to suit your needs.
• List price: *WorkMAN for Lotus Notes, $395. Reach Software Corp., 872 Hermosa Dr., Sunnyvale, CA 94086; 408-733-8685; fax, 408-733-9265.*
Circle 412 on reader service card
• List price: *ActionWorkflow System for Lotus Notes, $2,565; Manager, $650 per user; Analyst, $495; Application Builder, $1,495. Action Technologies Inc., 1301 Marina Village Pkwy., #100, Alameda, CA 94501; 510-521-6190; fax, 510-769-0596.*
Circle 413 on reader service card

IMPROVED

Tooled Up and Ready to Go

Keeping pace with Symantec's Norton Desktop for Windows, **Central Point Software** has released its latest Windows utility collection: PC Tools for Windows, Version 2.0. The new version has a graphical resource warning for Windows users, AutoSync Folders into which you can group applications and related documents, tutorials, and a new screen-capture utility. A part of the System Consultant helps you optimize your PC's configuration, and the AutoSync Desktop feature lets you arrange your desktop your way. PC Tools supports PKZIP 2.0 and Microsoft DoubleSpace; it also includes disk and Windows diagnostics.
• List price: *PC Tools for Windows, Version 2.0, $179.95; universal upgrade, $49.95. Central Point Software Inc., 15220 NW Greenbrier Pkwy., #150, Beaverton, OR 97006; 800-964-6896, 503-690-8090; fax, 503-690-5187.*
Circle 403 on reader service card

NEW & IMPROVED

Two Ways to Build Your BBS

Two recent releases can help you create your own BBS: **Galacticomm**'s The Major BBS, Version 6.2, and **Outpost Software**'s Visual BBS.

The Major BBS 6.2 has improved file transfer and uses Phar Lap 3.0 for more efficient protected-mode operation. Besides support for nonintelligent, multiport serial cards and 28.8-kilobit-per-second modems, it has a redesigned Polls & Questionnaires feature to help sysops configure intelligent branching surveys and a Quick Start booklet for novice sysops. Other features include QWK-mail for off-line mail capabilities and RIP*script*, a graphical protocol that lets you create a more dynamic, graphical screen to help your users navigate the BBS. RIP*paint* is an $199 add-on, WYSIWIG, paintbrush-like designer that converts the screens you create into RIP*script* commands.

BRIEFS

BILLING & SCHEDULING SOFTWARE

rupted or interrupt one task to start another, and has a number of built-in reports that you can modify. It lets you modify your entries to include off-site tasks or forgotten tasks, and can also track multiple users through a common task database on a single PC or a LAN. 800-669-4611, 510-843-1034.

Alumni Computer Group has its $295 PCLAWjr, a Windows-based package for law offices. It is modeled after pegboard accounting systems and has user-definable bill formats. Information is entered only once and can be transfered to checks, ledger cards, statements, and reports. The main module handles time-keeping for up to five users; optional modules add features like networking, remote transaction imports, and accounts-payable management. 800-387-9785, 416-292-0893.

ProSoft's tracking and billing package, Carpe Diem for Windows, Version 1.0, is sold in three parts: CDTracker ($180 per user) for actual time tracking; CDEntry ($120 per user), where administrative staff can computerize paper records; and a utility, CDAdmin, for admistrator maintenance of CDTracker and CDEntry. CDAdmin is included free with the purchase of either CDTracker or CDEntry. For transparent access to time data anywhere, Carpe Diem supports LANs and WANs. It also lets you have several time sheets open simultaneously. The company has also released an upgraded DOS version that features more user-defined fields and has support for expense report entries. Volume discounts and site licensing are available. 800-477-6763, 214-386-7769.

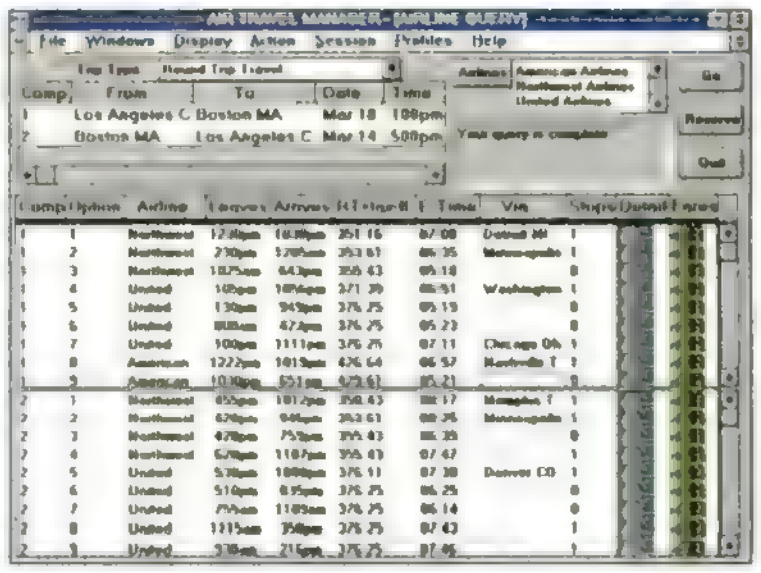
DOS-based Easy ($159) is **Kona Systems'** answer to employee scheduling. The software keeps track of requested employee hours, skills, availability, and shift requirements, letting you shuffle tasks around according to what you need and who is available. It also has a "Departments" feature that lets multiple departments within a company schedule up to 100 employees. 800-200-5662, 805-545-0743.

Visual BBS is a more basic bulletin board system. It doesn't require a dedicated computer, though the professional edition allows up to 1,000 users to have e-mail accounts. It is visually oriented to help novice users set up the BBS and includes a text editor to customize the log-on screen. It can also be used as a gateway to computer networks.
• List price: *The Major BBS 6.2, $259. Galacticomm Inc., 4101 SW 47th Ave., #101, Fort Lauderdale, FL 33314; 800-328-1128; 305-583-5990; fax, 305-583-7846.*
Circle 415 on reader service card
• List price: *Visual BBS: 10-user version, $99.95; professional edition, $249.95. Outpost Software, 642 San Miguel Ave., Sunnyvale, CA 94086; 408-736-1070; fax, 408-736-2263.*
Circle 416 on reader service card

NEW

Book Your Flights On-Line

Air Travel Manager is **Personal ExpertWare**'s new front end for Eaasy Sabre, a reservation system accessible on-line. This Windows- and CompuServe-based package simplifies the process of selecting flights and routings, making reservations, and receiving your tickets. It can handle all types of flights, from simple round trips to multiple-leg, open-ended fares. The interface makes querying Eaasy Sabre easier and faster by letting you see only the information that you need to see, without the airline codes. The software filters Sabre, picking out the relevant information for you and organizing it more accessibly. Air Travel Manager requires both CompuServe and Eaasy Sabre accounts. A 9,600-bps modem is recommended. The product is available to download for a 30-day free trial on the CIS or AOL Travel Forum.
• List price: *Air Travel Manager, $149. Personal ExpertWare Inc., 3517 208th Pl. NE, Redmond, WA 98053; 800-760-9273, 206-836-0755; fax, 206-836-2997.*
Circle 417 on reader service card



Air Travel Manager shows you the available flights, their stops, prices, and flight times.

Lowest Prices on the SX, DX & *New* DX2-50!

Rave Reviews! Read what the experts say:

"Scoring high in overall value and design, the Micro Electronics WinBook gives you a lot for your money, including an outstanding integral trackball."

PC MAGAZINE, Guide to Portable Computing, 8/93

COMPUTER SHOPPER "If you're a Windows user on a budget or just have a bad case of Mac envy, you should take a look at the WinBook. It's a machine that can hold its own with more expensive, less thoughtfully designed systems from other direct vendors."

COMPUTER SHOPPER, This Powerbook Twin Acts Like An A

WINDOWS MAGAZINE "The WinBook is a great example of what a Windows notebook should be: fast, easy-to-use and a miser on battery life. It's also inexpensive: nearly 50% less than some comparable notebooks."

WINDOWS MAGAZINE, Business Notebooks

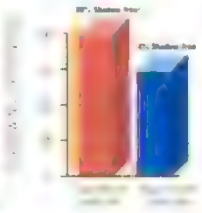
The WinBook Intel486 SX-25, DX-33 & DX2-50 SL Enhanced Features

Ergonomically engineered & designed by award-winning Palo Alto Design

The WinBook's unique ergonomic features include a sloping wrist rest and keyboard with full-size keys plus a centered clear-button trackball — allowing you to work in total comfort away from your desk.

Clear, sharp color display gives you near-active matrix quality at a passive matrix price!

Images are sharper and clearer with less cursor loss. And the WinBook's advanced dual-scan color display gives you 64 shades for performance compared to other single-scan passive matrix displays. You get a brighter, crisper, wider angle of view with an 18:1 contrast ratio — compared to 13:1 with previous passive matrix technology.



Longer battery life

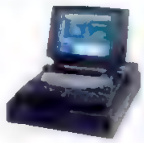
The WinBook features NiMH 2200 MA batteries with gold-plated contacts — allowing it to run much longer than units with traditional NiCAD batteries — and there's no memory effect!

The WinBook offers you more features for less!

- 9600 baud send/ 4800 baud receive fax/ 2400 baud modem
- Industry standard type II PCMCIA slot
- 512k video RAM
- Fast-acting LCD screen
- Built-in centered dual button trackball

Docking station gives you desktop power!

Two expansion slots and drive bays let you add peripherals such as monitors, hard drives, CD ROMs, I/O cards or an extended keyboard. Includes parallel, serial, PS/2 mouse, external keyboard and VGA ports. **And it's just $399!**



Mouse/keyboard, parallel, serial and VGA ports plus PCMCIA expansion

Upgradable processor!

WinBook

Micro Electronics

A Division of MEI Manufacturing

Editor's Choice Awards

First Runner-Up

98 units reviewed! Portable Computing Issue, August '93

Monochrome	Color Dual-Scan
$1599	$1999
4MB RAM/200MB HDD	4MB RAM/200MB HDD
• SL Enhanced Intel 486SX 25MHz	• Fax modem included!
• DOS and Windows	

Call for lowest DX-33 & DX2-50 prices!

Convenient payment options

Use your MasterCard, VISA, Discover Card, Micro Center charge, personal check or P.O. with credit approval.

Thank you for your order!

Service, warranty, support

- 72-hour service turnaround
- 30-day unconditional money-back guarantee
- 24-hour burn-in protection
- One-year limited warranty on parts and labor
- Toll-free technical support for the life of the computer

30-day unconditional money-back guarantee

SX & DX Specifications

Size/Weight

Pointing Device

Battery

Processor and Memory

Bitrous

Software

Microsoft Windows

Display

Keyboard

Modem

I/O Ports

Options

Hurry! Order today!
Call 1-800-468-2139

Monday-Friday, 8am-9pm EST • Saturday, 9am-4pm

1160 Steelwood Rd. Columbus, OH 43212 • FAX 1-800-44[illegible]

CIRCLE 085 ON READER SERVICE CARD

Backup the data where it's at.

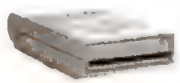
At the corporate network

PowerTape Series 4000

- QIC compatible
- 2 Gigabyte native/4 GB compressed capacity
- Up to 18 MB/minute backup speed
- Includes software, data cartridge and more
- Optional Cheyenne® ARCserve® for PowerTape®

PowerDAT Series 6000

- Digital Data Storage (DDS) technology
- 2 Gigabyte native/4 GB compressed capacity
- Backs up 300 MB as fast as 30 minutes
- Includes software, data cartridge and more
- Optional Cheyenne® ARCserve® for PowerDAT®



PowerTape Series 2400

- Quarter Inch Cartridge (QIC) compatible
- 2 Gigabyte native/4 GB compressed capacity
- Up to 18 MB/minute backup speed
- Includes software and more
- Optional Cheyenne® ARCserve® for PowerTape®

At the workgroup network

PowerTape Series 1100

- QIC compatible
- 525 MB native/1.05 GB compressed capacity
- Up to 12 MB/minute backup speed
- Includes software and more

Jumbo 500 AVAILABLE EARLY 1994

- QIC compatible
- 255 MB native/500 MB compressed capacity
- Up to 9.3 MB/minute backup speed
- Includes software, minicartridge and more

At the workstation

Jumbo 250

- QIC compatible
- 125 MB native/250 MB compressed capacity
- Up to 9.3 MB/minute backup speed
- Includes software and more

Jumbo 120

- QIC compatible
- 60 MB native/120 MB compressed capacity
- Up to 4.7 MB/minute backup speed
- Includes software and more

On the move

Jumbo Trakker 250

- Parallel port interface
- QIC compatible
- 125 MB native/250 MB compressed capacity
- Up to 8 MB/minute backup speed
- Includes software and more

Jumbo Trakker 120

- Parallel port interface
- QIC compatible
- 60 MB native/120 MB compressed capacity
- Up to 4 MB/minute backup speed
- Includes software and more

Optional Accessories

- Colorado® Brand tapes
- Colorado Backup for Windows software
- Support for UNIX®, OS/2® and Windows NT™
- Controllers to optimize backups
- Compatibility kits

PC WORLD WORLD CLASS 1993

PCComputing HARDWARE 200 1993 CATEGORY WINNER

LAN TIMES READERS' CHOICE 1993

Best Buy 1992 1993

PC MAGAZINE EDITORS' CHOICE

MVP 92 FINALIST

1991 BYTE POURNELLE'S USER'S CHOICE AWARD

COLORADO MEMORY SYSTEMS INC.

COLORADO TAPE BACKUP

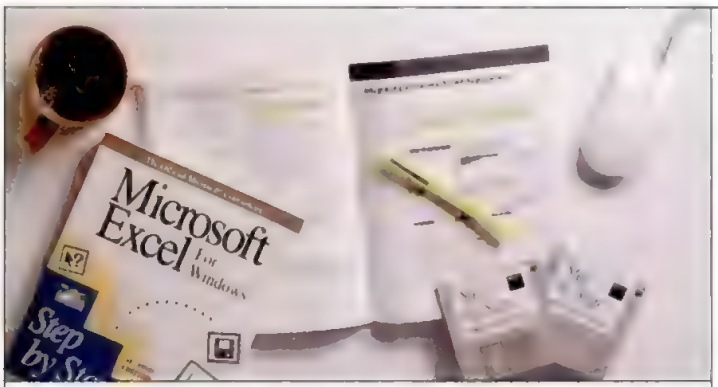
Colorado Memory Systems, the Number One name in tape backup, has a solution for most any backup need. ■ Beyond all the Megabytes and Megahertz that you get *out* of your system, it's the data *in* it that's ultimately your most valuable asset. Whether it's on an 80 MB notebook or a 4 GB server, the data needs to be protected every step of the way. ■ Colorado tape backup is the easiest and most reliable way to do it. And Colorado is recommended by resellers, editors and end users more than all other backup systems *combined*, earning dozens of industry awards. ■ Colorado Tape Backup is also the best backed backup in the business, offering unlimited technical support. Explore Colorado Tape Backup Solutions today and see what you've been missing.

Call **1-800-451-0897**, extension 800 today for more information or free literature.

© 1993 Colorado Memory Systems, Inc. All rights reserved. Colorado and Jumbo are registered trademarks of Colorado Memory Systems Inc. Trakker, PowerTape and PowerDAT are trademarks of Colorado Memory Systems Inc. All other trademarks are property of their respective companies. PTE-121593

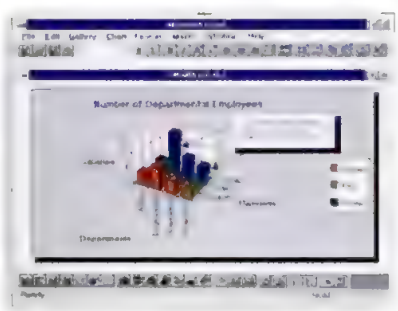
CIRCLE 073 ON READER SERVICE CARD

Personal Software Training Made Easy



Learning to use the latest versions of Microsoft® Excel, Microsoft Word, and Microsoft Access® has never been easier—or more convenient. Introducing *Step by Step* books from Microsoft Press.

Whether you're upgrading or starting from scratch, *Step by Step* books with disks are designed to help you learn quickly and efficiently on your own—at your own pace. You'll be up and running in no time—without classes or time away from work.

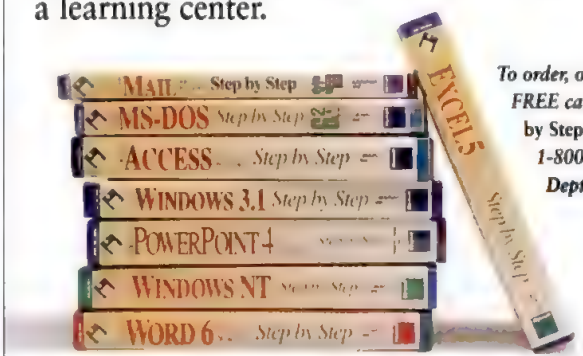


Timesaving practice files included on disk!

Each book comes complete with integrated examples on disk so you can put software features to use immediately. If you're a beginner, you can complete each course from start to finish. If you're upgrading from a previous version of the program, you can turn directly to information about new features. If you're switching from another software program, *Step by Step* books help you get results fast. Each lesson is completely self-contained and loaded with screen shots to guide you at every step. Interactive practice and review sessions make remembering what you've learned a snap.

MICROSOFT® WINDOWS™ COMPATIBLE

Step by Step books are flexible too. They can support existing software training programs and can be used as a core resource in a learning center.



To order, or for a FREE catalog of Step by Step *books, call 1-800-MSPRESS, Dept. APM.*

Learn to use Microsoft software the fast, easy way. Ask for *Step by Step* books from Microsoft Press. Available everywhere computer books are sold or directly from Microsoft Press.

Step by Step Books—Value, Quality, and Consistency in Do-It-Yourself Training

Microsoft Press

Accessing the Source

One Microsoft Way, Redmond, WA 98052-6399. In Canada, call Macmillan Canada. 416-293-8464, ext.3410.

Read Only

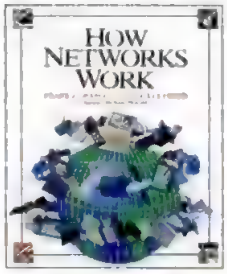
REVIEWS OF THE LATEST BOOKS FOR THE PC USER

Edited by Lance Ulanoff

Networking for When You're Ready and for When You're Not

BY RICK AYRE

There are two kinds of computer users: those who use computers because they want to, and those who use computers because they must. But *all* of us who use PCs, whether as part of our conscious plan or not, will soon be connected. Networks will be ubiquitous—if they aren't already.



How do PC users take control? They learn enough about the technology so that they can wrestle it to the ground, and often this involves buying a book. Good news. Some of the industry's best writers on the topic of networking have written books aimed squarely at PC users who, whether they like it or not, must deal with networks.

Frank J. Derfler, Jr., *PC Magazine*'s senior networking editor, and his collaborator Les Freed have teamed with illustrator Michael Troller on a new entry in the Ziff-Davis Press "How It Works" series called *How Networks Work*. This is a big picture book—big in at least two ways. First, it's full of big diagrams detailing everything from modem connections to linked LANs. The diagrams comparing Ethernet networks with Token-Ring and ARCnet networks are very useful. Second, the book describes the big historical picture of networking, from the telegraph to on-line information systems.

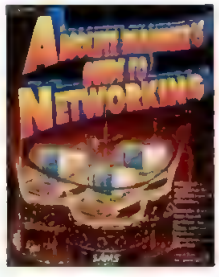
Derfler and Freed choose to drill down in some unlikely areas. We could have done with fewer pages on the differences among the liquid telephone transmitter, the Bell induction telephone transmitter, and Edison's carbon transmitter. And it would have been nice to read a few more words regarding some of the applications that are driving the trend toward workgroup computing, specifically Lotus Notes. Still, *How Networks Work* is a colorful, enjoyable work, and a valuable reference for the new networker.

ABSOLUTELY

Mark Gibbs's *Absolute Beginner's Guide to Networking* takes an altogether different look at networking that nicely compliments *How Networks Work*. Gibbs has a decidedly more local view of networking. He starts with what he calls the "Tyranocomputerus Mainframus" and works from there.

This guide to networking does a good job of combining the concepts of networking with the nuts and bolts of how it is done. Each chapter ends with a section called "What Have You Learned?," which is actually a great place to start if you have some idea of what you are looking for in the first place.

Gibbs's book is not really for absolute beginners. It is, however, the perfect book for those who know their PCs and want to learn just as much about their networks. It could even be used to plan a small network, such as one for a small business or one to install in your home.



There's a lot of information packed into Gibbs's work. For example, if you need to know about the Open System Interconnection (OSI) layers, you'll find that info here. And although not all of it is relevant to everyone, it's all well written and accessible.

Most likely you'll spend time learning about network interface cards (NICs) and how to connect PCs to networks, or you'll spend some time in the section of the book that describes common networking problems. Gibbs obviously understands that those of us who use PCs by choice like to know why things happen the way they do. And as Gibbs says in a quote he borrows from Frank A. Clark, "'If you find a path with no obstacles, it probably doesn't lead anywhere.'"

- **How Networks Work,** *by Frank J. Derfler, Jr., and Les Freed, illustrated by Michael Troller, $24.95; Ziff-Davis Press, 800-688-0448; ISBN: 1-56276-129-3.*

Circle 441 on reader service card

- **Absolute Beginner's Guide to Networking,** *by Mark Gibbs, $19.95; Sams Publishing, 800-428-4331; ISBN: 0-672-30326-4.*

Circle 442 on reader service card

A Colorfully Connected Look

"**Network Interface Card**
A network interface card, or LAN adapter, uses a specialized processor and routines stored in memory to move data to and from the computer's memory over the parallel data bus and to transmit and receive data on the serial network cable. It rearranges and buffers the data while handling the interface to the computer and the interface to the cable." —*How Networks Work*, pages 116–117.

Read Only Recommends

No Bugs: Delivering Error-Free Code in C and C++, by David Thelen, is a manageable tome for developers that features some very useful programming advice. $24.95; Addison-Wesley Publishing, 617-944-3700; ISBN: 0-201-60890-1.

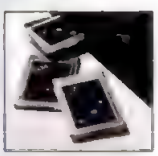
Call IBM PC Direct today!

More

More

HOT BUTTON: Our renowned TrackPoint II™ cursor-pointing device lets you leave your mouse at the house.

EASY ADD-ONS: PCMCIA cards make adding LAN connectivity, a modem or additional memory easy!



YOUR NAME HERE: You can order a free ID plate that personalizes your ThinkPad.

IBM® PC Direct™ has ThinkPads with more of what you want, and less of what you don't. More features and power. Less size and weight! The ThinkPad® 500 is a sleek 3.4 pounds. Yet, it packs enough high-speed horsepower to let you take your most sophisticated desktop applications on the road.

Now – want to carry off color with ease? Then call us about the ThinkPad 350C. You get a 9.2" backlit, 256-color, passive-matrix LCD display. There's plenty of power for your current needs. And ample space to upgrade for more. All in an easy-to-take 5.7-pound package. Both of these lightweights get the heavyweight backing of IBM's HelpWare®, including a 30-day moneyback guarantee† and around-the-clock telephone assistance.† You'll find them at IBM PC Direct. To order these, or any of our other critically acclaimed IBM ThinkPads, call now.

ThinkPad 500

- 486SLC2, 50/25MHz processor with 16KB internal cache
- 4MB RAM/85MB hard drive
- 10.1"w x 7.5"d x 1.6"h/3.4 lbs. with battery pack
- 7.4" monochrome passive-matrix LCD display, 64 grey scales
- 81-key keyboard w/integrated TrackPoint II
- PCMCIA slot
- IBM DOS preinstalled
- 1-year international traveler's warranty†

$1,999* (IBM Credit Lease $72 mo.**)

charge during warranty

portable.

IBM.

affordable.

ThinkPad 350C (color)

- 486SL, 25MHz processor with 8KB internal cache
- 4MB RAM/250MB hard drive, 3.5" 1.44MB diskette drive
- 11.7"w x 8.3"d x 2.0"h/5.7 lbs. with battery pack
- 9.2" STN backlit LCD, 256-color display
- Full-size keyboard w/integrated TrackPoint II
- PCMCIA slot
- IBM DOS preinstalled
- 1-year international traveler's warranty

$2,999* (IBM Credit Lease $108/mo.**)

ThinkPad 350

- 486SL, 25MHz processor with 8KB internal cache
- 4MB RAM/125MB hard drive, 3.5" 1.44MB diskette drive
- 11.7"w x 8.3"d x 1.9"h/5.2 lbs with battery pack
- 9.5" monochrome STN backlit LCD display, 64 grey scales
- Full-size keyboard w/integrated TrackPoint II
- PCMCIA slot
- IBM DOS preinstalled
- 1-year international traveler's warranty[2]

$1,999* (IBM Credit Lease $72/mo.**)

IBM PC Direct

We're putting the personal in personal computing.

Order Now!

1 800 426-7861

8am-midnight M-F, EST; 8am-7pm Sat., EST.

Purchase orders available for qualifying customers.

Unpar Tas

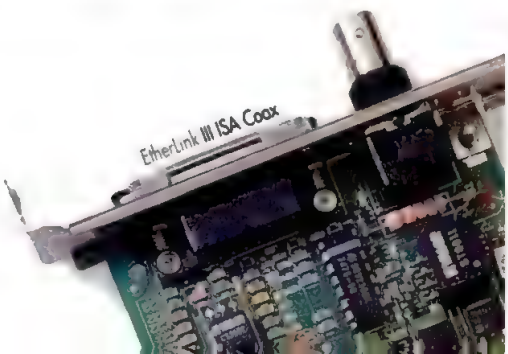
What would you call a technology that delivers the fastest adapters in the world? That has won immediate acceptance from network managers around the world?

Millions know it by the name Parallel Tasking.™ And you'll find it in only one place: The 3Com® family of EtherLink® III adapters.

With 3Com's Parallel Tasking adapters there is simply no faster way to run your network. And there is no other adapter line that offers more convenience and more performance at a lower price.

An EtherLink III Parallel Tasking adapter is SNMP-manageable. It is auto-configuring. And every 3Com EtherLink III adapter is backed by a lifetime warranty.

No wonder 3Com's Parallel Tasking adapters have



alleged king

been heralded by *PC Week*, *PC Magazine*, and *InfoWorld* as the number one adapter for network managers today. And for the second consecutive year, LANQuest Labs® has declared the Parallel Tasking architecture to be the fastest adapter technology available.

It's no surprise, then, that more than two million have been sold.

But why not judge for yourself? For just $99, we'll send you an EtherLink III Benchmark Kit* that includes two EtherLink III combo adapters and a *Guide to Benchmarking Network Adapters* from LANQuest Labs. Just call **1-800-NET-3Com.**

It's never been easier to put unparalleled performance on your network.

3Com®

Networks That Go the Distance™

CIRCLE 110 ON READER SERVICE CARD

*Limit one to a customer while quantities last. ©1993 3Com Corp. (408) 764-5000. 3Com, Networks That Go the Distance, EtherLink, and Parallel Tasking are trademarks of 3Com Corporation. LANQuest Labs is a trademark of LANQuest Group. All other trademarks are property of their respective owners.

THE NEW WORKPLACE™

[Sharp Pocketsize Touch Screen Wizard® OZ-9500]

"I've got the spreadsheets in my pocket...."

The new **WIZARD OZ-9500** electronic organizer. Without it, you couldn't carry spreadsheets* in your pocket. Or files. Or E-mail. Let alone access them at a touch. Without it, you couldn't fax on the go. Sketch a map. Write a letter. **WIZARD.** And send them to PCs or MAC®s. Wirelessly. Without it, you couldn't have an infrared exchange of messages, with associates, in meetings. **WIZARD.** Much less carry your diary, address book, business files and notepad. As easily as you carry your wallet. But with the **WIZARD,** you not only get proven technology, you get the electronic organizer that outsells all others combined. Not to mention, the power to make anyplace, your workplace.

1-800-321-8877

SHARP
FROM SHARP MINDS COME SHARP PRODUCTS™

LCD

COPIERS • FACSIMILE • LASER PRINTERS • NOTEBOOK COMPUTERS • COLOR SCANNERS • PERSONAL DIGITAL ASSISTANTS • CALCULATORS
CORDLESS TELEPHONES • TYPEWRITERS • WORD PROCESSORS • WIZARD® ORGANIZERS

©1993 Sharp Electronics Corporation. Mac® is a registered trademark of Apple Computer, Inc. *Requires optional software card. Simulated screen image.

Michael J. Miller

Software Patents Must Go

Innovation still abounds in the process of creating great new applications. But watch out! Lawyers armed with stacks of patents are becoming more and more prevalent. If they succeed, it can only mean very bad news for innovation and, in turn, for software users and the software industry in general. Consider these examples:

Compton's NewMedia was recently granted a patent that covers computer-based search and retrieval of text, graphics, and video. The company now claims its patent covers much of the multimedia work that other developers are doing and is asking other vendors of multimedia titles for significant royalties or distribution rights.

Microsoft and Stac Electronics are currently involved in a patent dispute over the use of data compression in their software. The concept of data compression isn't new, and the algorithms used are in the public domain. The question revolves around how these algorithms are used in software. To shore up their positions, both companies have gone out and purchased earlier patents.

It's been widely reported that when IBM and Microsoft were having trouble coming to terms in their software-licensing deal last year, IBM brought out its portfolio of more than 1,000 software patents. Microsoft then agreed to pay IBM some $20 million to $30 million in patent and licensing fees. Having been burned by Big Blue, Microsoft—which currently holds only 24 patents—now has a *goal* of applying for about 100 a year.

Meanwhile, things get even crazier. We hear that one very large vendor is quietly going around to other software companies and showing off patents on fundamental things, such as indents in word processing documents. Other companies have paid the holders of patents for things like the software expression "net price times quantity equals total cost." In many such cases, large companies find it far less expensive to pay off on such seemingly trivial patents than to fire up the legal staff to pursue the matters in court.

OUT OF CONTROL

The whole process is getting out of control. The U.S. Patent and Trademark Office has granted something like 12,000 software patents in the past decade. It now has a backlog of more than 3,000 software patents. Oh, and under U.S. law, no one even knows what has been submitted for a patent until the patent is awarded. If this trend goes on, you know what the result will be: Only the big companies will be able to buy lots of patent applications and pay the lawyers they'll need to defend those patents. Little software companies will probably find it harder and harder to compete.

All of this gets into the fairly murky area of intellectual property rights. Understand that such rights are supposed to protect the tangible expression of ideas, not the ideas themselves. In general, the concept has worked pretty well. We have patents, which stipulate that the inventor must share all the details of a new invention in exchange for 17 years of exclusive use, and we have copyrights, which protect the exact expression of an idea—from the words in this article to the graphics accompanying it to the music on the radio. We also have trademarks and trade secrets as part of the legal mix.

Litigation is going to slow down the development of new software. It's time to shout our disapproval—loudly.

All of these have their uses in some areas of technology, but I just don't see where patents make much sense in the software industry. Every single piece of software builds on the work of previous software developers. The concept of software itself—even the way software interacts with a microprocessor—is not new. Most of today's programs comprise ideas and algorithms that have existed for years in other media. Software development by its very nature tends to be evolutionary rather than revolutionary. To my way of thinking, there is little here to patent.

Illustration by Nishan Akgulian

Michael J. Miller

FREE SOFTWARE?

There are some extremists around who believe that all software should be free and shouldn't be covered by patents or even copyrights. I disagree. Well-defined intellectual property rights are necessary to give people the incentive to create great new products. Making great software these days costs so much money that companies need to be able to believe they will get good returns on their investments. But I still want companies to compete on the basis of who has the best software, not who has the best team of lawyers standing by, waiting to unleash a flurry of lawsuits at a moment's notice.

To that end, I think the existing system of software copyrights and trade secrets is enough protection for software. I believe that software companies should be able to copyright their applications. Copying source code without a license, duplicating the way that individual screens look, and simply pirating applications are all wrong, and the creators of software should be protected against such infringements. (On the other hand, the data you create in an application—and even the macros you create—should belong to you, not the application vendor. In this regard, I disagree strongly with Lotus, which seems to think Quattro Pro's ability to run 1-2-3 macros is an infringement of its copyright.) All of these situations are covered today under copyright law. I certainly don't believe that just because a company takes something you could do on paper and puts it into a software program for the first time that it should demand royalties whenever another vendor does the same thing—provided that no one copies its work. After all, mere ideas are not supposed to be protected, only the expression of those ideas in specific ways.

WHAT SHOULD BE DONE

Right now, even the U.S. Patent and Trademark Office is aware that software patents have spun out of control. And unfortunately, the situation has been made worse by problems at the office itself. The commissioner has said that the office's examiners haven't been qualified, that the department doesn't have enough information on precedents in the software industry, and that as a result some patents have been issued that are not going to be defensible in court. Concern seems justified.

The office plans hearings aimed at getting the process under control. That's a start, but I think the whole process needs a second look, and I wouldn't be sorry to see the whole concept of software patents thrown out. I'm sure we'll see a lot of this fought out in court over the next few years—in proceedings that are likely to be expensive, time-consuming, and confusing for all involved.

To cut through the murkiness that currently surrounds the issue of software copyrights, what we really need is new, more explicit laws detailing what software copyrights can and should cover. That's a job not for the courts but for Congress. If you agree, write your representative or tell it to Bill Clinton (on CompuServe, you can contact your representative or the president at "GO CONGRESS"; on the Internet, you can contact the president at President@WhiteHouse.gov). When laws get in the way of innovation, it's time to change the laws. □

CHECK✓ITPRO
ADVANCED SYSTEM INFORMATION UTILITY

TouchStone
Software Corporation
2130 Main Street, Suite 250,
Huntington Beach, CA 92648
(800) 531-0450 or (714) 969-7746
Fax (714) 960-1886

Get with the *PRO*gram!

PC MAGAZINE EDITORS' CHOICE
July 1993
CheckIt PRO:SysInfo

"TouchStone Software's $100 Check✓It PRO: SysInfo is the closest thing this category has to perfection."

We Couldn't Have Said It Better Ourselves...

"It made no errors reporting on either of our test systems, and it provided more detailed information on many hardware items in our test bed PCs than did the competition."

"Beyond the basics, Check✓It PRO reports on detailed drive mapping with suitable disk controllers and on the kind of UART your serial ports are using. Adding to Check✓It PRO's appeal is a set of benchmark comparisons that allows you to make sense out of the numbers that the benchmarks produce. If you get the SysInfo package and have any interest in diagnostics, you should consider the bundle of SysInfo & Tests and Tools."

"Quality of information is the key to a good reporting tool. As such, the program of choice for DOS users is TouchStone's Check✓It PRO."

— PC Magazine, July 1993

Copyright ©1993 TouchStone Software ALL RIGHTS RESERVED Checkit is a registered trademark and the Quality Tested Seal is a trademark of TouchStone Software Corp. Huntington Beach, CA

CIRCLE 004 ON READER SERVICE CARD

Meet Your Maker.

The end-to-end direct source that manufactures what it sells.

ACER COMPUTERS • THE INDUSTRY SOURCE •

Buy Direct From The Industry Source.

Acer raises the standard! All systems feature a CD-ROM.

You Need A CD-ROM Drive To Move Forward With Today's Technology.

Technology waits for no one—so don't wait for other companies to realize a CD-ROM drive is an essential part of a complete PC system. New encyclopedias of information, interactive multimedia software and virtual worlds of advanced information technology are already becoming mainstream. Now Acer makes sure you won't be left behind by making CD-ROM drives a standard feature on all desktop PCs. **And to top it off, all systems also come standard with MS-DOS 6.2 and Windows for Workgroups.**

AcerPower—For Power-Hungry Applications.

Ready for a Windows workstation that's fast enough to keep up with you—and multiple applications? Then the AcerPower series is made for you. Real power-users wouldn't settle for less than the screaming 32-bit processing power, integrated CD-ROM drive and VESA local bus accelerated graphics featured in the AcerPower line. And don't worry about the system taking up the whole room—the AcerPower series includes a slim minitower that's still big on power.

Acer ACROS—The Affordable High-Performance Workstation.

If you thought 486 power, 32-bit processing, a built-in CD-ROM drive and accelerated local bus video were way out of reach of your budget—think again! The Acer ACROS series has got it all at a price you can afford now. Add to your savings when you choose one of the EPA Energy Star-compliant Acer ACROS systems. Some models enter a low-power-use state to conserve energy and costs. Plus, Acer ChipUp™ technology makes upgrading these systems as easy as replacing the single CPU chip.

Join The Pentium™ Revolution With The AcerPower 9000T.

Make the next technological move up with the impressive Pentium-based AcerPower 9000T. Unmatched 64-bit processing speed and massive expansion capability add up to a system that will serve you for years to come—at a price you can afford now.

ACER COMPUTERS • THE INDUSTRY SOURCE •

Acer Power 9000T

- Intel® Pentium 60MHz CPU
- 8MB System RAM (expandable to 192MB)
- 256KB Second-level Cache
- 540MB Fast IDE Hard Drive
- Panasonic® 2X CD-ROM Drive
- 1.44MB Floppy Disk Drive
- 15" .28mm Dot Pitch Non-interlaced SVGA Color Monitor
- ATI PCI Graphics Accelerator
- 2 PCI 64-bit Expansion Slots
- 4 ISA 16-bit Expansion Slots
- 1 Combination PCI/ISA Slot
- Microsoft™ Windows™ for Workgroups, MS-DOS® 6.2, Productivity/Entertainment Packs, Works for Windows,™ and Quicken® Installed

$2,995
$108 A Month
Business Lease

Rely On The Strength Of A $1.8 Billion Giant.

Since our start in 1976, Acer has grown to be the vendor of choice for the world's top computer companies. Some of the biggest names in the industry recognize Acer as one of the most quality-conscious PC manufacturers in the world today. Our attention to detail, excellent record of reliability and great value have helped us to achieve status as the world's leading OEM manufacturer. Acer has achieved a solid reputation for innovation after 17 years of building unique computing solutions. You'll get new technology first with Acer. And now you can buy direct from the industry source.

$1.8 BILLION

intel inside

VISA LEASING

Now you

800-848-ACER

AcerPower 486DX2/66T

- Intel 486DX2/66MHz CPU
- 16MB System RAM (expandable to 64MB)
- 256KB Second-level Cache
- 420MB Hard Disk Drive and **2X CD-ROM Drive**
- 1.44MB Floppy Disk Drive
- S3 1MB VESA Graphics Accelerator
- 15" .28 Non-interlaced SVGA Color Monitor
- Upgradable to Intel Pentium Upgrade Processor
- Microsoft Works for Windows, Productivity/ Entertainment Packs and Quicken® Installed
- 8 16-bit ISA Slots, 2 on 32-bit VESA Bus

The Power House

$2,755
$99 A Month
Business Lease

AcerPower 486DX2/66

- Intel 486DX2/66MHz CPU
- 8MB System RAM (expandable to 64MB)
- 256KB Second-level Cache
- 340MB Hard Disk Drive and **2X CD-ROM Drive**
- 1.44MB Floppy Disk Drive
- S3 1MB VESA Graphics Accelerator
- 15" .28 Non-interlaced SVGA Color Monitor
- Upgradable to Intel Pentium Upgrade Processor
- Microsoft Works for Windows, Productivity/ Entertainment Packs and Quicken Installed
- 8 16-bit ISA Slots, 2 on 32-bit VESA Bus

PC WORLD BEST BUY

$2,355
$85 A Month
Business Lease

AcerPower 486DX2/50

- Intel 486DX2/50MHz CPU
- 8MB System RAM (expandable to 64MB)
- 128KB Second-level Cache
- 420MB Hard Disk Drive and **2X CD-ROM Drive**
- 1.44MB Floppy Disk Drive
- S3 1MB VESA Graphics Accelerator
- 15" .28 Non-interlaced SVGA Color Monitor
- Upgradable to Intel Pentium Upgrade Processor
- Microsoft Works for Windows, Productivity/ Entertainment Packs and Quicken Installed
- 8 16-bit ISA Slots, 2 on 32-bit VESA Bus

The Graphics Master

$2,195
$79 A Month
Business Lease

Acer ACROS 486DX2/50

- Intel 486DX2/50MHz CPU
- 4MB System RAM (expandable to 36MB)
- 128KB Second-level Cache
- 420MB Hard Disk Drive and **2X CD-ROM Drive**
- 1.44MB Floppy Disk Drive
- 1MB VESA Cirrus Logic™ Graphics Accelerator
- 14" .28 Non-interlaced SVGA Color Monitor
- Upgradable to Intel Pentium Upgrade Processor
- Microsoft Works for Windows, Productivity/ Entertainment Packs and Quicken Installed
- 4 16-bit ISA Slots, 2 on 32-bit VESA Bus

The Perfect Windows Workstation

$1,795
$65 A Month
Business Lease

Acer ACROS 486SX/33

- Intel 486SX/33MHz CPU
- 4MB System RAM (expandable to 36MB)
- 340MB Hard Disk Drive and **2X CD-ROM Drive**
- 1.44MB Floppy Disk Drive
- 1MB VESA Cirrus Logic Graphics Accelerator
- 14" .28 Non-interlaced SVGA Color Monitor
- Upgradable to Intel Pentium Upgrade Processor
- Microsoft Works for Windows, Productivity/Entertainment Packs, Quicken and Prodigy® Installed
- 4 16-bit ISA Slots
- **128KB Cache Upgrade.....$35**

Excellent Price/ Performance

$1,495
$54 A Month
Business Lease

can buy Acer direct.

Monday through Friday 6 AM-6 PM and Saturday 8 AM-4 PM Pacific Time
Also available through our fine resellers and retailers.

When calling, please reference #034 ACD

Upgrade Your Monitor

For just a little extra money you can see a lot more. Take advantage of our monitor upgrade program.

$99
Additional

AcerView™ 56L 15" Color Monitor

- 15" Non-glare Flat Square Screen
- Low Radiation CRT
- Superfine 0.28mm Dot Pitch
- 1024 x 768 Resolution, NI
- Intelligent Micro-control System
- Ergonomic Tilt/Swivel Base

$549
Additional

AcerView 76i 17" Color Monitor

- 17" Non-glare Flat Screen
- Superfine 0.28mm Dot Pitch
- iColor System for Color Adjustments
- Intelligent iScreen Menus
- Automatic Display Mode Switching
- 16 User-programmable Display Modes
- VGA, SVGA, XGA, VESA and CAD/CAM Compatible
- VLMF Low Radiation Feature

Call for prices to purchase monitors separately.

Multimedia Upgrade Kit

Make the most of the new Acer CD-ROM standard with this special multimedia upgrade kit that includes: Sound Blaster and Business Audio-compatible 16-bit Sound Card; High-performance Stereo Speakers; Microsoft Multimedia Bundle with Works, Encarta,™ Golf, Cinemania™ and Soundbits.™

Only **$195**

Acer

Come to the source for all your notebook needs.

Acer Manufactures Its Own Notebooks.

At Acer, we know notebook computers inside and out—because we manufacture them ourselves. So when you're working on the road and need your network, mainframe or other resources that you use most, you can rely on your AcerNote for power and convenience. Stay connected with the PCMCIA capabilities featured in the AcerNote 750 and 735 series of modular color notebook computers. With PCMCIA, slide in a PC-card and you can tap into your network, send information to a fax machine via modem or access additional storage devices.

Service And Support

Talk To A Helpful Engineer 7 Days A Week/24 Hours A Day.

Have a question about how to set up your system? Want to know how to get going on Microsoft Works for Windows? Curious about what options are available with your system? Just call us toll-free, any time of day, any day of the week and our trained professionals will be happy to help.

A Full Year Of On-Site Service.

Don't worry. If you have a problem with your Acer desktop system, we'll have a skilled service representative out to you in 48 hours—we promise.

Express Parts Replacement.

Because time is money, we will get replacement parts out in less than 72 hours.

30-Day Money-Back Guarantee.

We are so sure that you'll be totally satisfied with your new Acer system that we're offering a full 30-day money-back guarantee—no questions asked.

AcerNote 735c 486SX/33

Introducing The Flexible New 486SX/33 AcerNote 735c Series.

Now you can have outstanding 486SX/33MHz power and speed with the new AcerNote 735c series. Incredible flexibility can be yours anywhere you need it with PCMCIA ports and a high-performance CPU packed into a sleek and sophisticated notebook computer with local bus video.

intel inside

- Intel 486SX/33MHz CPU
- 4MB System RAM
- 2 PCMCIA Type II Slots/1 Type III Slot
- 9.5" Passive-matrix Color Display
- 209MB Hard Disk Drive
- Palmrest with Integrated Trackball
- **Local Bus Video with 512KB VRAM**
- MS-DOS 6.2, Microsoft Windows 3.1
- International Travelers Warranty
- 24-hour "Hot Swap" Warranty

$2,395
$86 A Month Business Lease

ACER COMPUTERS • THE INDUSTRY SOURCE

VISA LEASING

Now you can buy Acer direct.

Also available through our fine resellers and retailers.

AcerNote 750c 486SL/25

- Intel 486SL/25MHz CPU
- 4MB System RAM
- 2 PCMCIA Type II Slots/1 Type III Slot
- 9.5" Active-matrix Color Display
- 209MB Hard Disk Drive
- Palmrest with Integrated Trackball
- MS-DOS 6.2, Microsoft Windows 3.1 and Works for Windows Installed
- International Travelers Warranty
- 24-hour "Hot Swap" Warranty

Active-Matrix Color Display ✓

$3,695

$133 A Month Business Lease

AcerNote 735 486SX/33

- Intel 486SX/33MHz CPU
- 4MB System RAM
- 2 PCMCIA Type II Slots/1 Type III Slot
- 9.5" Monochrome Display
- 209MB Hard Disk Drive
- Palmrest with Integrated Trackball
- **Local Bus Video with 512KB VRAM**
- MS-DOS 6.2, Microsoft Windows 3.1
- International Travelers Warranty
- 24-hour "Hot Swap" Warranty

Blazing-Fast Local Bus Video ✓

$1,795

$65 A Month Business Lease

AcerNote 730 486SX/25

- Intel SL-Enhanced 486SX/25MHz CPU
- 4MB System RAM
- 9.5" Monochrome Display
- 120MB Hard Disk Drive
- Palmrest with Integrated Trackball
- Fax Modem and Software
- MS-DOS 6.2, Microsoft Windows 3.1 and Works for Windows and Prodigy Installed
- International Travelers Warranty
- 24-hour "Hot Swap" Warranty

Exceptional Value And Performance ✓

$1,495

$54 A Month Business Lease

Super Travel Pack

Now get all the accessories you need for on-the-road computing power with the Acer Super Travel Pack!

- Leather Carrying Case—an elegant fine-grained leather case to protect your investment
- PCMCIA-Fax/Data Modem—send and receive faxes on the move
- Auto Power Adapter—taps into additional power through your car's cigarette lighter
- Spare Battery—the back-up you just can't do without
- **Numeric Keypad.....$65**

On-The-Road Computing Power ✓

$495

Assistance Around The Globe.

When you take your Acer notebook on the road, you take first-class service and support with you. The AcerNote series is backed by a one year, 24-hour replacement warranty in the U.S. and Canada. To assure you the security of support in over 20 countries worldwide, a free one-year Acer International Travelers Warranty is also included.

Call 800-848-ACER

Monday through Friday 6 AM-6 PM and Saturday 8 AM-4 PM Pacific Time

When calling, please reference #034 ACD
CIRCLE 034 ON READER SERVICE CARD

Acer Notebook Accessories

When it comes to notebook computers—Acer wrote the book! You'll find a full range of notebook computers offered in the AcerNote lineup, so you can be certain of finding just the right one for you. Plus, if you need any other peripherals or notebook accessories, count on Acer for the best in quality and performance.

PCMCIA Fax/Data Modems

14.4 Fax/Data Modem
$299

9600/2400 Fax/Data Modem
$199

PCMCIA Cards

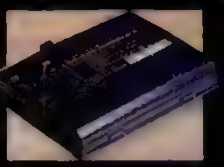
IBM Ethernet–Coax
$349

IBM Ethernet–Twisted Pair
$349

Spare Battery

NiMH Battery Pack
AcerNote 750–$199
AcerNote 735–$169
AcerNote 730–$169

NiCad Battery Pack
AcerNote 750–$119
AcerNote 735–$99
AcerNote 730–$99



Additional Memory

AcerNote 750, 735 or 730 Series–4MB Memory Upgrade
$269

AcerNote 735 or 730 Series–8MB Memory Upgrade
$699

AcerNote 750 Series–16MB Memory Upgrade
$1,599

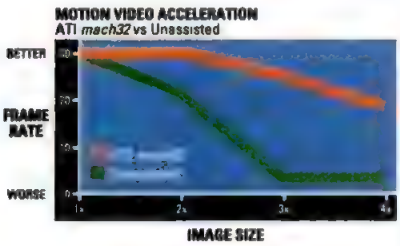
Please call 1-800-848-ACER for details on the money-back guarantee, limited warranty and International Travelers Warranty. Return shipping and insurance charges are the responsibility of the customer. Not available in Canada. On-site service may not be available in certain remote locations. Products, availability, prices and programs are subject to change or cancellation without notice. Shipping and handling charges are extra. Acer, AcerACROS and the Acer logo are registered trademarks and AcerNote, AcerPower, AcerView, ChipUp and SmartCase are trademarks of Acer America Corporation and Acer, Inc. Intel and the Intel Inside Logo are registered trademarks of Intel Corporation. All other brands and product names are trademarks or registered trademarks of their respective companies. ©1994 Acer America Corporation. All rights reserved.

Acer

GRAPHICS AND MULTIMEDIA ACCELERATORS

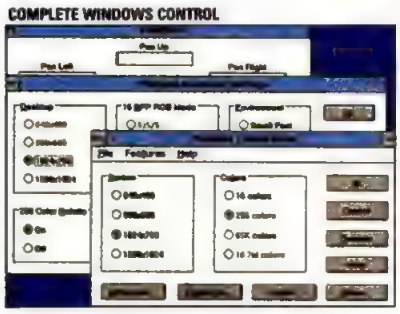
Heavyweight Features, Lightweight Price, No-wait Performance.

Tired of waiting for slow graphics? Disappointed by stripped-down bargain-basement accelerators? Don't despair, the new ATI GRAPHICS WONDER gives you high quality, full featured graphics for just $199.

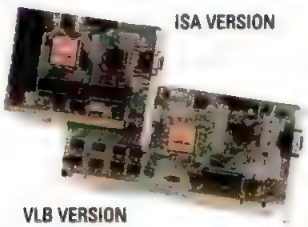


GRAPHICS WONDER gives you the massive ongoing support you've come to expect from ATI. With a hefty 5-year warranty and enhanced heavy-duty drivers for all major applications. Plus heavyweight features unheard of at these prices!

ATI GRAPHICS WONDER: affordable graphics power for users who are tired of waiting.



GRAPHICS WONDER™



Fundamental Features

- Accelerates graphics and motion video
- Up to 1024x768 NI** resolution
- Up to 16.7 million colors
- Flicker-free images with 75Hz vertical refresh
- Driver support for Windows 3.1/NT, OS/2, VESA, and CAD
- Windows control panel with virtual desktop
- 5-year warranty

... and much more

accelerated by mach32 ATI TECHNOLOGIES INC

FAX (905)882-2600
ATI Literature by Fax Doc.#1020

ATI TECHNOLOGIES INC.
Perfecting the PC

ATI TECHNOLOGIES INC.
33 Commerce Valley Drive East
Thornhill, Ontario CANADA L3T 7N6
Telephone: (905) 882-2600 ext. 1
Facsimile: (905) 882-2620
Download BBS: (905) 764-9404
Compuserve: GO ATITECH
76004,3656

Copyright ATI Technologies Inc., 1994. ATI, GRAPHICS WONDER, *mach32* are trademarks and/or registered trademarks of ATI Technologies Inc. All other company and/or product names are trademarks and/or registered trademarks of their respective manufacturers. Features and specifications are subject to change without notice. Products may not be exactly as show. *Suggested US retail price, dealers may sell for less. **Non-interlaced.

CIRCLE 127 ON READER SERVICE CARD

Bill Machrone

Dead Architecture Lives Again

Andy Grove says the PC was dead, and as the CEO of Intel, he oughta know. The architecture, he says, was utterly moribund by 1989, and it stayed that way for several years. It was resurrected by the local buses, which integrated the machine's high-speed subsystems and peripherals far more tightly with the CPU. Thus the ever-faster chips from Intel could more fully realize their potential. Customers got full value from their systems, and the PC came back with a vengeance.

It's true that today's buses—VESA, PCI, and PCMCIA—address customer needs in a way that EISA never did. EISA was swell (okay, it was adequate) for file servers but did little or nothing for desktop computing. We won't belabor here the many self-inflicted wounds that prevented Micro Channel from having a wider influence. Some of the other weirdnesses of the time, such as the ACE consortium and the NeXT machine, were the result of manufacturers' belief that there was a widespread market for graphics workstations on the desktop and that the PC's architecture just wasn't up to the task. They were wrong on the first count and right on the second. However, they underestimated the PC manufacturers' ability to reinvent the machine to match your needs.

While Dell was first to show a machine with an Intel-inspired, proprietary local bus, VESA's VL-Bus standard made local bus a desktop reality. The two big beneficiaries are video speed and disk access times; VL-Bus versions of network cards are few and far between.

Meanwhile, PCI was delivered a year late because of some overly optimistic forecasts by Intel and some design and production difficulties, and some good old-fashioned FUD designed to prevent the VL-Bus from becoming too successful. Now that PCI is finally here, it looks pretty good. PCI and the VL-Bus will coexist for some years to come, as VESA rolls out a faster and more capable Version 2.0.

The PC still isn't as easy to expand and reconfigure as a Mac, but with Plug and Play it's getting darn close.

IT'S FAST, BUT . . .

The manufacturers could see that the bus wars were essentially over, but there was this little, nagging problem: They hadn't made the machines any easier to use. Any savvy person could point to a Macintosh as the exemplar of easy expandability. Even Micro Channel, with its vaunted device ID codes, required bothersome setup disks that could get lost.

The solution is Plug and Play. This new standard is being spearheaded by Microsoft, Intel, and Compaq, but it's an open standard. In fact, Intel is freely distributing its portion of Plug and Play to every manufacturer in the industry. The ultimate goal: You plug in a new card, turn the machine on, and it works.

We're not quite there yet; you have to run a Plug and Play configuration program that resolves interrupt, DMA, and I/O port conflicts. In seconds, though, it does what used to take you hours of poring over manuals, flipping DIP switches, changing jumpers, and calling tech support. Some of the earliest examples of PnP claimed to be compliant with the specification, but the spec wasn't final yet. These machines have been termed Plug and Say or Plug and Pray. New PnP machines coming on the market are more likely to be fully compliant with the published spec.

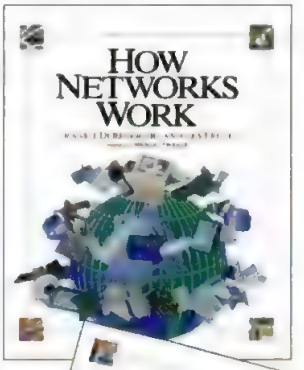
We probably won't see automatic installation of software drivers and fully automatic resolution of interrupt conflicts until Microsoft ships Chicago/Windows 4, and it may only work on some machines. Intel is specifically not addressing self-installation; it's Microsoft's baby. The key to PnP is 20K or so of extra BIOS code that gives the machine the basic intelligence it needs to resolve conflicts and share scarce resources among cards. Most of the machines you

Illustration by Nishan Akgulian

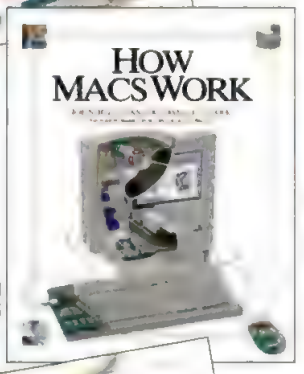
Imagination. Innovation. Insight.

No other books bring computer technology to life like the *How It Works* series from Ziff-Davis Press. Lavish, full-color illustrations and lucid text from some of the world's top computer commentators make *How It Works* books an exciting way to explore the inner workings of PC technology.

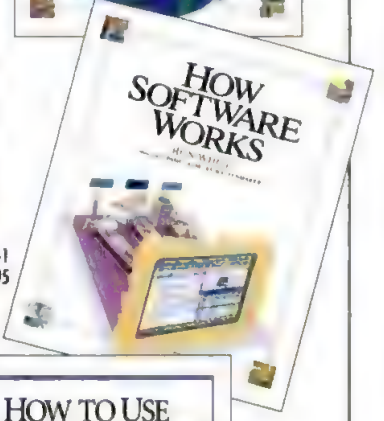
ISBN: 094-7
Price: $22.95



ISBN: 129-3
Price: $24.95

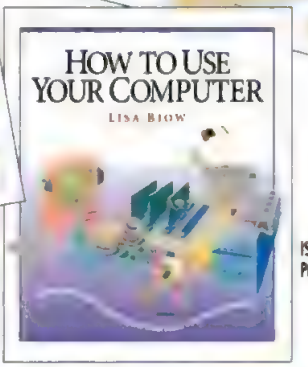


ISBN: 146-3
Price: $24.95



ISBN: 133-1
Price: $24.95

ISBN: 166-8
Price: $15.95



ISBN: 155-2
Price: $22.95

AVAILABLE AT ALL FINE BOOKSTORES OR CALL 1-800-688-0448, EXT. 8367

ZIFF-DAVIS ZD PRESS

© 1993 Ziff-Davis Press

Bill Machrone

buy from here on out will have the PnP code, but manufacturers are unlikely to provide replacement ROMs for older machines. I also infer from this that Chicago will have features available on machines with the PnP BIOS that won't be available on older machines. Will they be reason enough to upgrade? We'll see.

Even with Intel's wide distribution of the code and general agreement among the hardware manufacturers, PnP is going to take some time to sort itself out. It has to work seamlessly among ISA, PCI, VL-Bus, and PCMCIA cards, and each of those cards requires an additional chip to perform its reconfiguration magic. The chip itself is inexpensive—$5 at the most—but the time it takes to reengineer all of those boards and to get the PnP versions into production will be a serious gaiting factor. Intel says it will all be transparent in a year, but I think that's optimistic. That's a lot of boards to redesign and get into distribution. Meanwhile, Intel is touting PCI boards as being the most PnP-ready because they already have flash ROM on-board to store configuration information. In fact, VL-Bus 2.0 cards will be just as suitable.

Plug and Play will also work, within limits, with your existing, non-PnP (or "static," as they're being called) cards. Intel is building a huge database of card characteristics, collecting information from manufacturers on configurations, default settings, and available options. Using the database, you should be able to configure your PnP cards around the most stubborn static cards. The database and the PnP software will also tell you about conflicts that may arise between your static cards, but can't resolve them automatically because the cards lack PnP's programmability.

In truth, Plug and Play is not that difficult a technological feat. It could have been done earlier, but it requires a tremendous amount of coordination among players whose interests are not always congruent. It's in Intel's interest to play the coordinator; few other companies have the resources or the influence. Some manufacturers typify Intel's coordination as overbearing, even bullying, but Intel defends its aggressiveness as being for their own good—and yours.

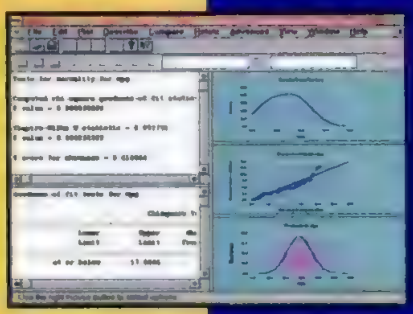
The PC still isn't as easy to expand and reconfigure as a Macintosh, but it's getting darn close. It wasn't dead, Andy. It was only sleeping.□

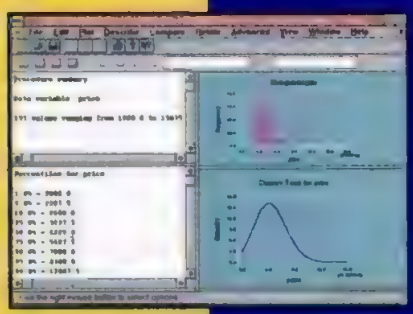
Read This if You're *CRAZY* About Statistics:

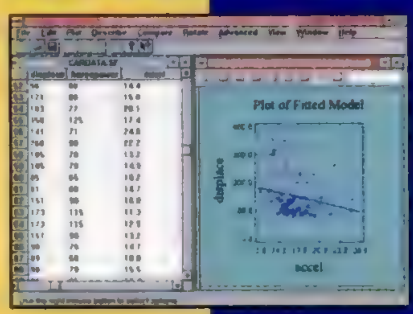
The more you know about statistics, the more you'll love STATGRAPHICS *Plus*. With its completely menu-driven procedures, spectacular interactive 3-D graphics, and a choice of DOS or Windows versions, STATGRAPHICS *Plus* wraps together everything you've ever wanted in a statistics package.

STATGRAPHICS *Plus* makes complicated statistics easy. Point-and-click menus give you access to regression analysis, ANOVA, quality control, experimental design, multivariate and time series methods, nonparametric statistics, and much more. And STATGRAPHICS *Plus* for Windows includes our revolutionary new StatFolio, which makes saving and reusing your work a breeze. Then, when you need to rerun last week's analysis on a new set of data, just a few mouse clicks will recalculate everything automatically.

If you're ready for statistical graphics software that thinks the way you do, call us for details about STATGRAPHICS *Plus*. You'd be crazy not to.







Read This if Statistics Drives You *CRAZY*:

The less you know about statistics, the more you'll love STATGRAPHICS *Plus*. Because you can use it to master statistics even if you barely *remember* statistics. STATGRAPHICS *Plus* is the easiest-to-learn, easiest-to-use statistical analysis package you can buy. And it's available in both DOS and Windows versions.

No matter how little you remember, or ever learned, about statistics, STATGRAPHICS *Plus* knows it all. In fact, *PC Magazine* says that STATGRAPHICS *Plus* "artfully combines statistics, graphics and data manipulation in an almost seamless way." With just a few keystrokes or mouse clicks, STATGRAPHICS *Plus* will help you make an accurate sales forecast, improve a manufacturing process, or work toward a cure for cancer. And if you ever need assistance, you can rely on our award-winning documentation, intelligent on-line help, and telephone support.

Fact is, STATGRAPHICS *Plus* is the perfect statistical graphics package for people who aren't crazy about statistics. After all, your data analysis problems shouldn't have to drive you insane.

STATGRAPHICS® *Plus*

In Maryland, 301-984-5123, Outside the U.S., 301-984-5412

800-592-0050, ext. 200

Manugistics, Inc., 2115 E. Jefferson St., Rockville, MD 20852. STATGRAPHICS is a registered trademark of Statistical Graphics Corporation. Quote reprinted from *PC Magazine*, May 11, 1993. Copyright ©1993 Ziff-Davis Publishing Company, L.P. Other trademarks are the property of their respective owners. STATGRAPHICS *Plus* runs on 386, 386SX, and 486 computers with at least 4 MB of RAM and a graphics card. DOS version for 286/640K machines also available. Authorized international dealers. Australia (03)866 1766, United Kingdom (071)436 9481, France (01)45-27-20-61, Germany (089)45114-0, (069)80053-0, (0212)339099, Italy (02)29404830, Spain (01)5350125, Sweden (031)776 01 21, Netherlands (03402)66336, Hong Kong 851-7998, Korea (02)222-3418, Taiwan (02)788-6777, Malaysia (03)717-0077, Poland (012)128-270, Singapore 254-5245.

CIRCLE 385 ON READER SERVICE CARD

MultiSync is a registered trademark and FastFacts is a trademark of NEC Technologies, Inc. NEC #QS00K61AQS0.241 © 1993 NEC Technologies, Inc.

You want the truth? Here it is. NEC's new MultiSpin® 3X CD-ROM readers are the best-performing readers on the market.

We were the first to introduce double speed. And now we improved our data transfer rate to 450 Kbytes/sec. and made a triple-speed reader. (Because that's what you wanted.) We also cut our access time to less than 200 milliseconds, added a 256-Kbyte continuous-flow cache, SCSI 2 interface and a full 16-bit SCSI card.

Which means you can get your information three times faster than you can with standard readers, see smoother animation and video.

NEC MultiSpin 3Xp and 3Xe

Our new MultiSpin CD-ROM readers are not only fast but interactive, with stand-alone audio controls and an LCD display on the front panel. So you don't have to rely on your computer to tell you what's going on (or not going on) with your reader.

They're compatible with Macs and PCs, as well as Kodak Multisession Photo CDs. And, they come with the longest commitment in the industry – a 2-year limited warranty.

For more information, call 1-800-NEC-INFO. Or for details via fax, call NEC FastFacts™ at 1-800-366-0476, request document #23768. We'll answer all your questions about CD-ROM. And you'll actually get to have an honest conversation for a change.

NEC

CIRCLE 157 ON READER SERVICE CARD

Music To Your Eyes.

The ZEOS® ColorNote™... scaling new heights.

STANDARD WITH EVERY ZEOS COLORNOTE 486

- 33MHz 486SX Intel processor.
- RAM expandable to 20MB.
- IDE hard drive expandable to 170MB.
- 8K internal cache.
- Internal 3.5" 1.44MB floppy disk drive.
- PCMCIA slot supporting a type I, II or III device.
- 512K video RAM.
- Local bus video for super-fast video performance.
- Display: 640 x 480 dual scan color VGA backlit LCD, 9.4" diagonal, up to 256 colors.
- Supports an external SVGA color monitor at resolutions up to 1024 x 768.
- 82-key keyboard with embedded numeric keypad and 12 dedicated function keys.
- Built-in trackball.
- Replaceable and rechargeable NiMH battery.
- One serial port, parallel port, keyboard port, mouse port and external video port.
- Full power management features include Low Power mode and programmable Stand-by features.
- AC adapter from AC 110-240V to DC.
- 8.54" x 11.65" x 1.5"; 5.6 lbs.
- FCC Certified Class B; UL Listed.
- Complete ZEOS Customer Satisfaction Package.

PACKAGE 1

ColorNote 486: $2395
Lease $87/month
- 4MB RAM
- 80MB IDE hard drive

PACKAGE 2

ColorNote 486: $2695
Lease $98/month
- 4MB RAM
- 120MB IDE hard drive
- Microsoft DOS 6.2
- Microsoft Windows for Workgroups 3.11
- Lotus Organizer

PACKAGE 3

ColorNote 486: $2995
Lease $108/month
- 8MB RAM
- 170MB IDE hard drive
- Custom leather carrying case
- Microsoft DOS 6.2
- Microsoft Windows for Workgroups 3.11
- Lotus Organizer

CALL NOW TOLL FREE
800-554-7172

With color and power you can't beat, the ZEOS ColorNote 486 is the only color notebook worth taking note!

We started with a reliable 486SX Intel processor running at 33MHz with 8K built-in cache. Then we loaded it with enough memory and power to run Windows: 4MB or 8MB RAM (expandable to 20MB), an 80MB, 120MB or 170MB IDE hard drive. And, we added local bus video for super-fast video performance.

ZEOS dual scan screen (left) fires up rich, vibrant colors while standard passive matrix screen (right) produces faded and dull colors. Photos are not retouched.

What's more, it comes equipped with a PCMCIA slot, an internal floppy drive, built-in trackball and a Nickel-Metal Hydride battery. If your needs go beyond the standard scale, you can compose a personalized package with our many options. Let the ColorNote be the basis for your creative scores and presentations.

Blazing colors seem to sing. Images are vibrant and alive. For a crisp VGA backlit screen displaying up to 256 colors, the ColorNote employs dual scan technology–a breakthrough that achieves color comparable to that of a desktop color monitor yet is not as expensive as active matrix.

AWARD-WINNING SERVICE

ZEOS has won more *PC Magazine* Readers' Choice for Service & Reliability awards than any other company–five in all!

We're here for you 24 hours a day, 365 days a year, and always a toll-free call away. All ZEOS systems come with a One Year Limited Warranty and 30-Day Money-Back Guarantee.

Fax Orders: 612-633-1325, Government: 800-245-2449, Hearing Impaired (TDD): 800-228-5389, Outside U.S. and Canada: 612-633-6131. Purchase Orders, MasterCard, VISA, Discover, Am Ex, Z-Card,℠ COD and affordable leasing programs. Open 24 Hours a Day, 365 Days a Year!

ZEOS INTERNATIONAL LTD

Purchase orders are subject to approval. Business leasing programs available. Lease prices based on a 36-month lease, 10% purchase option. All prices, specifications and availability are subject to change without notice; call to confirm these and warranty details. Prices do not include shipping. All products and company names are trademarks or registered trademarks of their respective holders. ZEOS is a registered trademark. Z-Card and Computers Now! are registered servicemarks. ColorNote is a trademark of ZEOS International Ltd. ©1994 ZEOS International Ltd., 1301 Industrial Blvd., Minneapolis, MN 55413 USA. ZEOS is a publicly traded company (NASDAQ symbol: ZEOS).
CLR-PCM-9403A

CIRCLE 036 ON READER SERVICE CARD

John C. Dvorak

Of Tail Fins and Notebooks

I've been following the progress of the notebook market, and I'm starting to observe a phenomenon that closely parallels the heyday of automobile manufacturing. Back in the 1950s and 1960s, automakers came out with one radical design after another, and buyers lusted after the latest models year after year. Compare a 1956, 1957, 1958, and 1959 Chevrolet (or just about any car made during this era), and you'll see they had little in common. Of course, the engines and transmissions were similar, but so much of the car was redesigned that buyers wanted to trade in their old cars for new cars every year.

So I'm looking at the IBM 700C and 750C and see the same phenomenon. The newer machine is sleeker, lighter, more feature-rich. It feels better. I want one. Of course, I wanted a 700C when it came out, but now I don't. It was somehow attractive at first. Now, in comparison, it's not. Will I feel the same way a year from now when IBM brings out an 800C or a 770C or whatever it'll call the next one? The new model will be lighter and sleeker and sexier and make the 750C pale by comparison.

IBM is not alone. Toshiba made great strides when it released the T4600C. Compared with the T4400C, it's far superior and includes a keyboard connector so you can use it as a desktop computer without a dopey docking station. Now we have these new lightweight color machines. A Toshiba 4700C puts the 4600C to shame. Just like the automobile scene in the fifties.

This situation creates a number of issues that the PC industry is not prepared to handle. The problem is that an old machine is a piece of worthless junk. Unlike a car, a notebook becomes useless in about three years. The processor is too slow and the screen stinks in comparison with a newer unit's components. While you could buy a great ten-year-old, well-maintained car and rely on it for transportation, this isn't the case with an old used notebook. Just imagine a ten-year-old notebook—an 8088 that can run virtually no modern software. So it's difficult to subscribe to the new-machine-every-year concept that worked so well with Cadillacs and Chevys. You got your money's worth out of the old car. You get nothing from an old notebook.

Although the used-notebook marketplace isn't exactly thriving, I think it has a chance of developing since the mechanism to get you to buy a new notebook every year is in place. Here's what I think will happen in the short term: You have your IBM 700C and you want to get the 750C (or whatever). You have to sell fast while the 700C is still worth something. You want to get as much from the 700C as you can get, so what will you do? You'll sell it with your collection of software installed on the machine. "Yes, everything you want is already on the machine" is what you'll tell the buyer. "Cool! That will save me a fortune" will be the response. Of course, first you'll transfer the programs you need onto your new computer. As the market grows, this petty piracy will start to add up. It's not a healthy situation.

The solution is to change the law that applies to used parts. As the law stands now, manufacturers can't sell a computer made with recycled chips and PC boards as "new," despite the fact that a memory chip is about the same new or used. It's not as though the chip is a light bulb about to fail. But the law sees it differently, and the law has to change. If manufacturers were allowed to recycle their old notebooks legally while the parts were still usable (say, within two years), then you could trade in your old notebook for a new one. An old notebook could be factory-upgraded into a newer unit and then sold as new. A new case, a faster processor, whatever's needed. Manufacturers could do the same with desktop machines.

It's called recycling, and it's about time we did it with our computers if we want to have the latest equipment on our desks and on the road.

If chips and boards could be recycled, then old PCs—worthless junk today—could be worth a bundle.

Illustration by Nishan Akgulian

Matrox MGA:

The World's Fastest Graphics Accelerator

The proven 64-bit graphics series

Accelerate your Windows, CAD and Multimedia applications to their graphical limits as they take advantage of MGA's 64-bit technology. Not only does MGA provide the world's fastest performance, but MGA also gives you the productivity features you need most. And MGA has received over a dozen awards to prove it!

MGA Ultima

MGA's newest PCI and VL additions to the Ultima family provide the ultimate low-cost graphics solution for the PC Power User. The MGA Ultima starts at $599 for 2 MB of VRAM and the MGA Ultima Plus, at $699, is fully upgradeable to 4 MB.

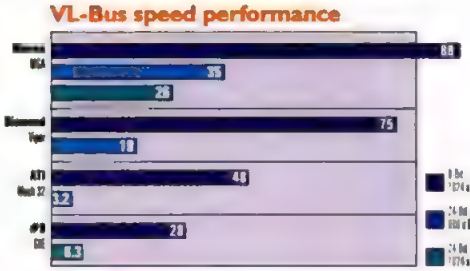
MGA Ultima Specifications

- Up to 90 million WinMarks' of blazing speed
- Up to 35 million WinMarks' in 24-bit color
- Up to 1600 x 1200 in 8 and 15-bit color
- Up to 1152 x 882 in 24-bit color
- Refresh rates up to 120 Hz
- Accelerated 24-bit Video-for-Windows playback
- Real-time CAD acceleration with our powerful DynaView™ drivers.

MGA Impression and Impression Pro

And for professional true color and 3D CAD users, Matrox offers the MGA Impression series of graphics boards which provide 24-bit color acceleration at resolutions up to 1280 x 1024 and real time manipulation of 3D wireframe and Gouraud shaded drawings.

VL-Bus speed performance



MGA's feature-filled Control Panel

Access MGA's advanced Windows features using a practical control panel:

- **Instant Modeswitch™** on-the-fly resolution and color depth switching without exiting Windows
- **Pixel Touch** hardware pan and zoom (2x,4x)
- **QCDP™** true color simulation in 8 and 15-bit at resolutions up to 1600 x 1200
- **Virtual Desktop** sizes up to 1600 x 1200
- **VideoView** full screen VfW playback at 30 frames per second

Matrox - proven performance

Matrox's reputation for reliable hardware and solid drivers is a result of nearly two decades of proven performance in developing graphics solutions for companies like Sun, Hewlett Packard and IBM. Matrox is now bringing its technological innovations and workstation-level products to the PC market but for thousands of dollars less.

MGA offers support for PCI, VL, ISA and MCA, and driver support for Windows 3.1, NT, OS/2, X-Windows, AutoCAD and MicroStation. For more information, call:

1-800-361-1408

MatFax: (514) 685-8176

©1993 All rights reserved. Matrox, Matrox MGA, Matrox QCDP, Matrox Instant Modeswitch are registered trademark of Matrox Electronic Systems, Ltd

(1) Based on in-house testing of a 2 MB MGA Ultima PCI version using Ziff-Davis WinBench 3.11, Pentium 66MHz, 512K cache, 72 Hz
(2) Based on in-house testing of 2 MB VL boards using Ziff-Davis WinBench 3.11, Pentium 66MHz, 512K cache, 72 Hz. MGA and Number Nine's 1024 x 768 x 24-bit scores are based on 4 MB VL boards

M A T R O X
MGA™
POWER GRAPHICS

matrox

Matrox Electronic Systems, Ltd.
1055 St-Regis, Dorval, Quebec, Canada H9P 2T4
Tel: (514) 685-2630 Fax: (514) 685-2853

CIRCLE 124 ON READER SERVICE CARD

John C. Dvorak

Inside Track

By the time you read this, Intel will have three to five monster fabrication plants all **dedicated to the Pentium.** Intel intends to stave off the RISC threat (especially the one posed by the PowerPC) to its business by **flooding the market** with fast Pentium machines. Taking Intel out of the PC scene is not going to be easy, if it's even possible. There's no doubt, though, that the new **PowerPC chip** running on the Mac will be a success, thus giving the chip a foothold. According to third-party insiders who have close access to Apple's PowerPC project, the machines are **blazingly fast.** More important, not only is their backward compatibility excellent, but their **emulation performance is outstanding.** I find this last aspect of the design mighty interesting because I've never seen decent emulation. It's always too slow or buggy. People working with the PowerPC chip say that its **strength** is an architecture that's friendly to emulation. So if Apple can make the chip emulate the Motorola 68000, then others can make it emulate the Pentium. When that happens, look for a lawsuit.

PowerPC units reportedly offer blazing speed and outstanding emulation. If Apple can make the chip emulate the 68000, others can make it emulate the Pentium. Look for a lawsuit when that happens.

Genuinely Interesting Software Dept.: If this database isn't the bargain of the year, I don't know what is. Joe Uhrmacher is an old-time clone builder who, **frustrated** with an inability to locate the addresses and phone numbers of vendors, developed the Computer Vendors Directory. He's been selling this labor of love for a few years now. It currently contains about **110,000 names and numbers** of computer-related companies worldwide. There's also a short description of what they do. The directory is updated monthly, and every company is **verified and updated** constantly over an 18-month cycle. It's available on ten floppy disks (about 130MB worth of compressed data) in dBASE, Paradox, or Q&A format. The price is a **ludicrous $49.95.** This database is **worth ten times** what Joe is charging. And if you send the disks back within a year, he'll update them for free! A great little product. Write Computer Vendors Directory, 908 1st Ave. N.W., Minot, ND 58701, or phone 701-838-5395. If you have any interest in the computer scene, no matter how minor, you need this database.

DOS for Dummy Executives Dept.: According to a Robert Half International study, about half of all executives in the U.S. and the U.K. are computer-illiterate. Slews of **excuses** are made, such as "fear" and "intimidation" and even "reluctance to change." How many decades will we have to continue to hear these "executives" **whining** about computers before we fire them all? If my 8-year-old can set up and use a computer with very little help, then I think there's no excuse for a 50-year-old CEO not spending a few minutes with a kid to learn to use one of these machines. This next comment may sound like a leap, but I'll say it anyway. If you wonder **why ISDN has not been fully implemented** in this country as it should be, I think you can blame these executives who should be pushing for such change and modernization of the **communications infrastructure.** Of course they haven't a clue about the communications infrastructure. Duh! These guys are the major influencers of such decisions. The country cannot afford to let these throwbacks to the 1890s remain in these positions. End of diatribe 914.

While on the Subject of Eight-Year-Olds Dept.: As many of you have noticed, a new trend in software retailing is to put a slew of **demoware, crippleware, and sampleware** (how much of this can you stand!?) on a CD-ROM. Some are full packages you can unlock by calling an 800 number and paying money to get a code. The newest CD-ROM sales tool is **going after the kids.** It's called Club KidSoft. Luckily, this is an outstanding product despite the fact that it is supposed to be a sales tool. The product is sold on a subscription basis. The $9.95 subscription fee (such a deal!) gets you four large-format kids' magazines with plenty of projects inside plus **four CD-ROMs** per year. The CD-ROMs include standalone games and storytelling, along with promotional demos for a variety of children's software. **The good news:** My son spent hours with the disk and book and didn't ask me to buy anything! The disk was entertaining enough. **The bad news:** The company will lose money if all the kids are like mine. Call Club KidSoft for a subscription at 800-354-6150 or send a fax to 408-354-1033. Oh, the disk runs **both** under Windows and on the Mac. Such dual-use disks should be offered by everyone developing for CD-ROM.

Book Nook: If you're in the mood to develop software, you should spend a little time with a new $44.95 book from Nolo Press (950 Parker St., Berkeley, CA 94710; phone, 510-549-1976; fax, 510-548-5902). It's called *Software Development, A Legal Guide* by Stephen Fishman. It's a **tremendous resource** and includes sample contracts on-disk. After plowing through this book, I learned **more** than I want to know. Also, if you want to read up on **patents and copyrights,** this is the book for you. Highly recommended. □

No one else brings

All the selection. All the service.

Announcing CompUSA Direct!

Get the buying power of the world's largest computer superstores in your home.

We're the world's largest chain of computer superstores. In fact, more people buy computers and software from us than anyone else. And now, CompUSA Direct offers you the same incredible selection, guaranteed low prices, super service and super support—right in your own home. Just pick up the phone and call **1-800-CompUSA** any time of the day or night and you can have it all!

Guaranteed Low Prices.

We regularly check our prices against our competitors' to make sure ours are lower. And if you ever happen to find a lower advertised price, we'll beat it. Better than guaranteed low prices, they're verified.

GUARANTEED VERIFIED LOW PRICES

Over 5,000 Products.

We offer the most incredible selection of computer products imaginable—including hardware, software, printers, accessories, furniture and more. When it comes to buying power, other direct companies don't even come close.

The Most Name Brands.

No one else offers all these name brands. Here's just a sample: IBM, Compaq, Toshiba, NEC, Packard Bell, Dell, Texas Instruments, Canon, Epson, Borland, Sharp, Claris, ATI, Okidata, U.S. Robotics, Sony, Lotus, Panasonic, Microsoft, WordPerfect, Hewlett-Packard.

*Technical support available through your nearest CompUSA Superstore Technical Service Center. On-site service is available within the continental U.S. only. **Defective merchandise may be replaced with the same item only. Original packaging and proof of purchase is required to return any merchandise. All Hayes modems and laser printers, and some other printers, monitors and laptops must be sent to authorized service centers.

all this to your door!

All at guaranteed low prices.

Super Service. Super Support.

No one else offers complete technical support like CompUSA Direct. Plus, an extended warranty, in-store repair and on-site service are also available.*

Best Business Support.

CompUSA's Corporate Division is your best business connection. Your company gets a personal Account Representative to handle all your business needs, plus quick delivery, easy ordering, guaranteed satisfaction and more. We'll even help you set up a network.

Easy 30-Day Return Policy.

Returns are not a problem, with our 30-day money back guarantee.** Plus, there's no credit card surcharges or re-stocking fees for returned products.

Custom System Configuration.

Order it your way. Just tell us what you want and we'll customize a system for you right over the phone.

intel inside

And look for the *Intel Inside*® symbol on your quality computer products.

24-Hours A Day. 7 Days A Week.

Every hour of every day, CompUSA Direct is standing by to take your order. Call **1-800-CompUSA** for a FREE catalog, filled with over 5,000 products.

Call Today for a Free Catalog

COMPUSA DIRECT℠

1-800-COMP USA

VISA DISCOVER

The Intel Inside logo is a registered trademark of Intel Corporation. All other trademarks belong to their registered owners. For international orders, call 1-214-888-5770. CompUSA Direct is a registered servicemark of CompUSA Inc. CompUSA Direct, 15167 Business Avenue, Dallas, TX 75244

CIRCLE 144 ON READER SERVICE CARD

OPEN THE BOX THAT LAUNCHED A MILLION MULTIMEDIA PRESENTERS.

Action!

MACROMEDIA

Create Multimedia Presentations in Minutes!

Action!

Like you, those one million presenters were tired of their static presentations. So they opened Action! and immediately began creating memorable multimedia presentations that turned their ideas into income.

With Action!™ for Windows™ or Macintosh®, you'll get all the easy-to-use tools that have made it the world's most popular multimedia presentation software.

Action! gives you the power to build complete multimedia presentations in minutes. Choose from the dozens of professionally designed templates, or import existing Harvard Graphics, Freelance, Persuasion, or PowerPoint slides into Action! and add graphics, video, animation, sound, and interactivity to bring new life to your favorite presentations.

You can add impact by animating any element of your presentations and building in Video for Windows™ clips, QuickTime® movies, or sounds from our free ClipMedia™ library.

If you want even more choices, pick up our new *Action! CD-ROM Bundle*, which includes over 1,000 ready-to-use graphics, video and music clips, sound effects, and a full-featured sound editor.

Once you've got it all together, you can present on any Windows- or Mac-based laptop or desktop PC. And you can even distribute your presentations on videotape or use our royalty-free Action! Player to reach the largest possible audience.

All of this explains why publications like *PC Magazine*, *Windows*, *MacWorld*, and *MacUser* have continued to recognize Action! with awards ever since it was introduced.

So call us at **1-800-945-4055*** to discover how the multimedia tools in every Action! package can help you launch your business into the next level.

Because this is the opening you've been waiting for.

MACROMEDIA

TOOLS TO POWER YOUR IDEAS.

*Outside North America, fax 415-626-0554. All registered marks, trademarks and product names are the properties of their respective holders. ©1994 Macromedia, Inc. All rights reserved.

CIRCLE 275 ON READER SERVICE CARD

Jim Seymour

Everything Old Is New Again

Who'd have ever thought it would happen? That the humble tab, as in file-folder tabs and ring-binder tabs, would become such an important metaphor in constructing graphical interfaces?

While we were focusing on dialog boxes, ribbon bars, tear-off menus, rip-offs of Apple's Balloon Help, and other new-age GUI devices, the humble tab has stumbled in the back door of Windows and OS/2 applications to remind us that newer isn't always better, but simpler is.

A couple of months ago, I bemoaned the amount of screen real estate consumed by interfaces that rely on "The Way It Was" metaphors such as waste baskets, date books, and other traditional office-environment objects that have been dragged onto the limited confines of a computer's screen. The problem is, I grumbled, that all these warm, cozy, and supposedly familiar metaphors for computer work waste a lot of space.

Not so with the tab. Indeed, a view of a series of pages or cards with user-labeled tabs sticking up turns out to be a *very* efficient way to jump through a great variety of information quickly, without wiggling and writhing through intervening menus and submenus.

The use of file folder–style tabs in PC interfaces certainly isn't new. The earliest example I recall was in WordVision, a brilliant, highly graphical DOS word processor that shot through the skies of the then-new IBM PC–software world in 1982 like a comet: burning brightly, then disappearing. In retrospect, WordVision has served as a free R&D department for the software business—its bones picked over for a decade by programmers looking for so-called new ideas.

In one of its innovations, WordVision allowed for long, descriptive filenames for its documents; you called up existing files from a screen full of file-folder tabs bearing those documents' names. Those long file names didn't seem quite revolutionary then. We were still in the early days of learning to describe the world with eight characters followed by a period—followed by three more characters. But the file-folder tabs immediately got new users' attention: Clearly, this was how it ought to be, and how it soon would be in every program. Uh-huh. Sure.

The humble tab metaphor is making a comeback in graphical interfaces, and it's a welcome sight.

A QUIET RETURN

With only a few exceptions, tabs slipped into disuse after that, until Borland made clever use of them in its spreadsheet workbooks in Quattro Pro for Windows, Release 1.0, in September 1992. The metaphor was so effective—both the idea of gathering worksheets into binderlike groups and that of displaying the names of the individual sheets on the divider tabs across the bottom of the screen—that Lotus and Microsoft soon enough borrowed the idea.

Those tabs made it fast and easy to jump from one sheet to another in the workbook. This was a *natural* metaphor—at once both familiar and, for a change, efficient. Tabs have made 3-D spreadsheet models both understandable and practical for most PC users.

In Microsoft Word for Windows 6.0, released late in 1993, we now see tabs used to solve another problem, one endemic to rich applications using graphical interfaces: the Submenus Chase.

It's fast and easy to click on pull-down menus or button bars to evoke their submenus. That works well for basic functions, such as filing or printing, which are likely to have only one submenu—say, for indicating a new file name or the number of copies to print. (And providing alternate, one-click button bars for these same functions—a button with an image of a printer, for example, that allows for quick printing using the default settings—is equally desirable.)

But what about those functions that offer multiple

Illustration by Nishan Akgulian

Yes! That's 62% off on every issue!!!

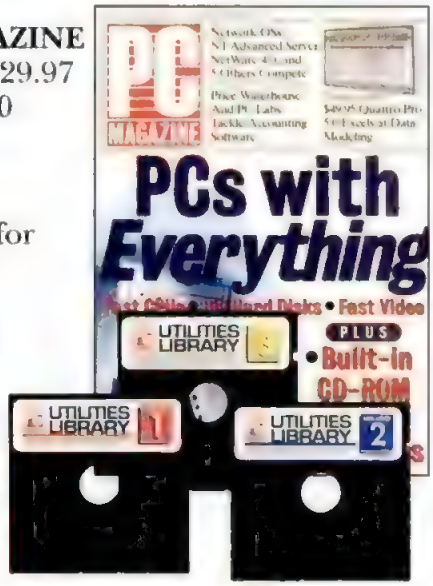
Call now to get PC Magazine delivered to your door for up to 62% less than you'd pay at the newsstand.

Act fast...
and get software FREE!

Call now and you'll get our new-subscriber bonus — 3-disks packed with 146 all-star utilities for DOS, Windows™ and Laptops — FREE with your paid order!!!

- **1 YEAR of PC MAGAZINE** (22 issues) for only $29.97 — 54% off the $64.90 cover price!
- **SAVE MORE!** 2 YEARS (44 issues) for only $49.97 — that's 62% off!

BONUS: 3-DISK UTILITIES LIBRARY — FREE!



PC MAGAZINE

CALL 1-800-289-0429

To insure savings and bonus, be sure to mention this code when you call: 4Z94

Jim Seymour

levels of choices? Should the user be forced to zigzag down through layer after layer of cascading submenus and sub-submenus? In good GUI design, no function should be more than a couple of button-clicks away from the "surface" of the GUI. In Word for Windows 6.0, tabs help deliver that.

Click on many Word for Windows menu choices (or button-bar icons), and rather than being sent on the click-scroll-hunt chase of the program's earlier versions, you'll see a display of file-folder-like pages, with tabs identifying each page across the top of the array. Click on any tab and you move directly to that page.

This notion of quick access to many program options at once reaches its height, logically enough, in Word for Windows' Options screen. Users have one-click access to a dozen different default-setting screens.

Note that this approach not only makes for fast access to settings and commands but also helps the new user learn to navigate through the menu tree. When the command you need is buried two or three layers deep in a menu tree—but without what seems to you a logical link to the topmost level in that tree—it can be almost impossible to find. But when all of the command's suboptions are visible once that command is selected, finding the right path becomes an easy task.

Doubt the value of seeing all the submenu options at once? Think back to your early days with DOS versions of Lotus 1-2-3. Remember all the time you spent */WFF*'ing around, trying to find buried-and-forgotten commands? If you haven't been using PCs that long, ask someone who has; the memory of all that groping around lingers long after Lotus 1-2-3 for DOS and its *slash-something-something-something* command tree have disappeared from a hard disk.

Using tabs as quick-access tools hasn't come a moment too soon. The depth and complexity of new Windows applications—Word for Windows 6.0 is a fine example—are astonishing. Adding features and sophisticated options is wonderful—until users have to *find* those features and options.

When I carped about GUI displays becoming cluttered with symbols of the past, I should have made an exception for tabs: They're among the best of the paper-based metaphors made fresh for the electronic age. □

HIGH-RESOLUTION LASER QUALITY PRINTING IS NO LONGER HIGH PRICED PRINTING. INTRODUCING THE OKIDATA 400e-SERIES.

If you thought that outstanding clarity and detail were only possible with a premium-priced laser printer, take a close look at the new OL410e. Now you can produce the same superb output you see here for a lot less. The OL410e is an easy-to-use 600 dpi-class output printer with 4 pages-per-minute speed, at a price well below typical 600 dpi lasers. With the OL410e, any PC user can look *Fortune 500*® on a home office budget.

Okidata also offers standout 300 dpi resolution with *PC Magazine's* Editors' Choice winning OL400e. The experts said, "...if you want laser quality, you won't find a better bargain." Both models support Okidata's tradition of reliability with an unsurpassed 5-year LED printhead warranty.

Stand Out

See Okidata 400e-Series print quality for yourself. Call 1-800-OKI-TEAM ext. 357 for the dealer nearest you.

You'll find values that make your output stand out.

OL400e

OL410e

YOUR BUSINESS HAS NEVER LOOKED BETTER.™

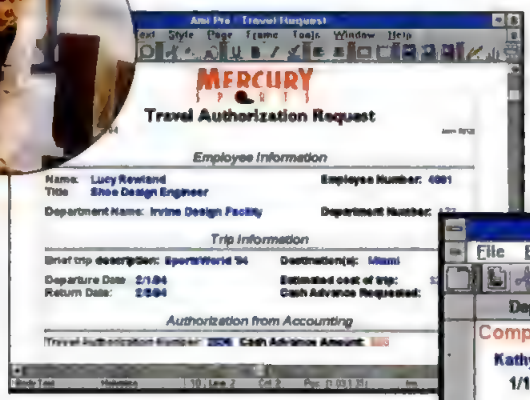
CIRCLE 056 ON READER SERVICE CARD

The New OKIDATA 400e Series Personal Printers.

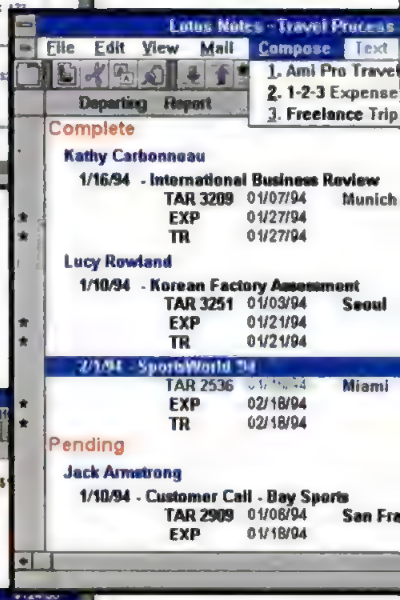
Okidata Reg. T.M., M.D. Oki Electric Industry Co., Ltd. "Your Business Has Never Looked Better" T.M. Oki America, Inc.

GETTING SOFTWARE TO WOR
GETTING PEOPLE TO WORK

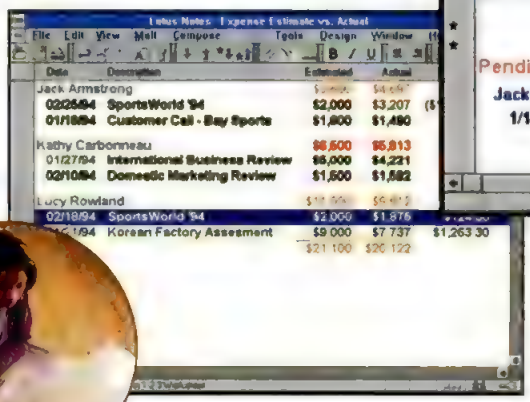
2 WITH A SIMPLE COMMAND, LUCY LAUNCHES FROM NOTES INTO THE TRAVEL AUTHORIZATION FORM IN **AMI PRO** TO PREPARE FOR HER TRIP TO SPORTS WORLD. NOTES HAS ALREADY FILLED IN MOST OF THE TEMPLATE WITH LUCY'S FILE INFORMATION. SHE FILLS OUT THE REST OF THE INFORMATION AND THE TRAVEL DOCUMENT IN NOTES IS UPDATED.



1 THIS NOTES APPLICATION SHOWS HOW A COMPANY CAN AUTOMATE THE TRAVEL PROCESS. HERE, **LOTUS NOTES** CONTAINS THE AMI PRO TRAVEL REQUEST, THE FREELANCE TRIP PRESENTATION AND THE 1-2-3 EXPENSE REPORT. ANY AUTHORIZED MEMBER OF LUCY'S WORKGROUP MAY ACCESS, SORT AND REPORT ON THE DATA BECAUSE OF THE NEW NOTES/FX TECHNOLOGY.



5 JANE, THE DEPARTMENT MANAGER, CAN QUICKLY DO A CHECK TO SEE WHO HAS EXCEEDED THEIR PLANNED EXPENSES BY VIEWING FROM WITHIN **NOTES** THE ESTIMATED EXPENSES (FROM AMI PRO) AGAINST THE ACTUAL EXPENSES (FROM 1-2-3).

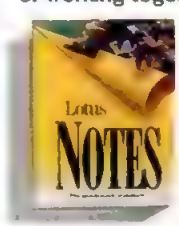


Integrating five top-rated Windows™ applications to work together as one was the big idea behind Lotus® SmartSuite.®

Now, Lotus SmartSuite, featuring five highly useful and usable Windows applications, all seamlessly integrated, raises the bar again with the most powerful and most sought after capability in business systems today: The way to get people working together.

The Version Management™ technology in 1-2-3® remains the clearest, most meaningful way to make sense of shared data by letting each user know who made what changes when and why.

But now, to really experience the power of working together, combine SmartSuite with Lotus Notes.®



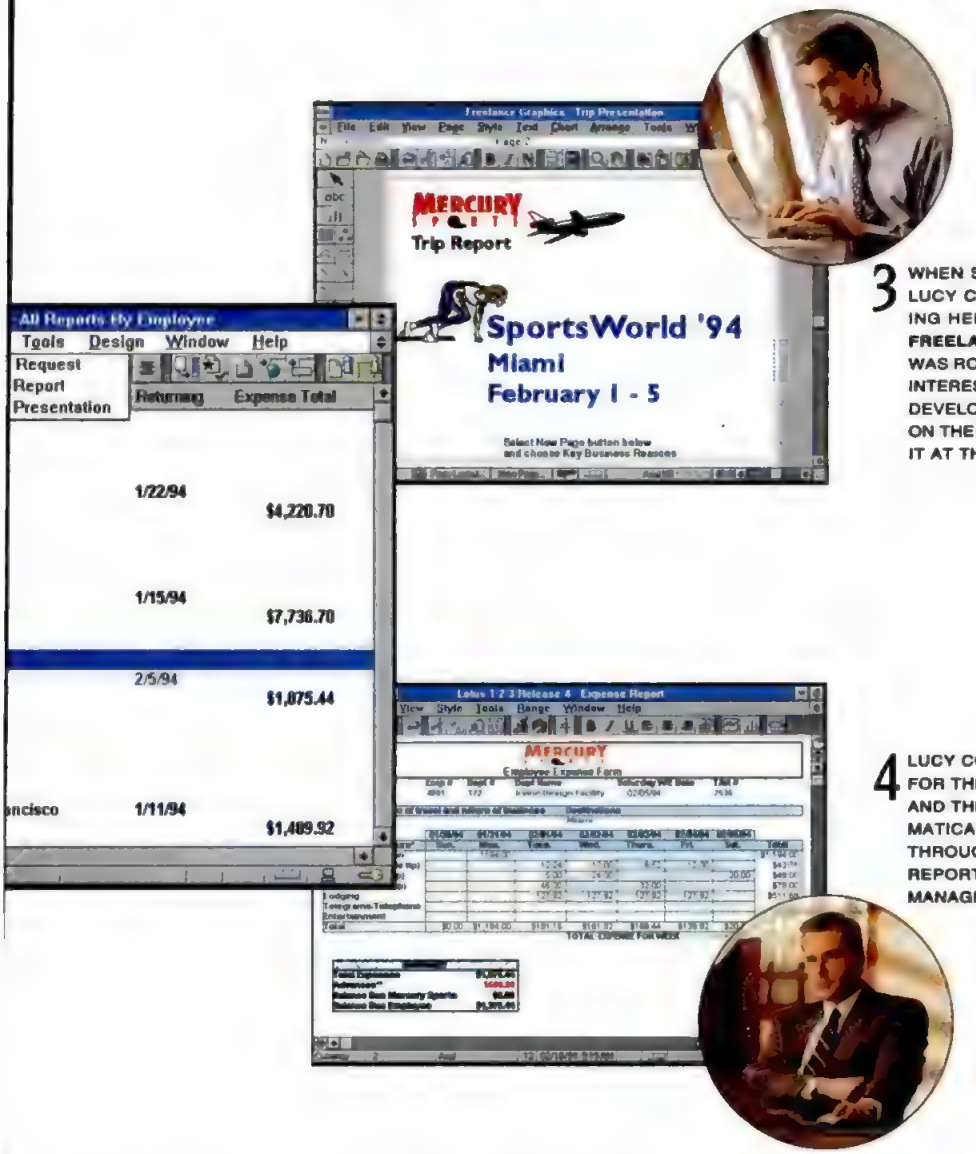
SMARTSUITE AND LOTUS NOTES. THE SECRET TO INTEGRATING WORKGROUPS.

The most important technology for empowering workgroups is now found in a whole new software application category called groupware. And the product that defines and leads this category is Lotus Notes.

Right now, PC users in thousands of companies around the world use Notes and Lotus applications to access, track, share and collaborate on data in ways never before possible. In ways that simplify and speed up their everyday business processes to make them more competitive.

*$299 promotional price available while supplies last. ** In Canada call **1-800-GO-LOTUS.** Prices may vary. ©1994 Lotus Development Corporation, 55 Cambridge Parkway, Cambridge, MA 02142. All rights reserved. Lotus, Microsoft is a registered trademark and

K TOGETHER IS SOMETHING. TOGETHER IS EVERYTHING.



3 WHEN SHE RETURNED FROM HER TRIP, LUCY CREATED A PRESENTATION REPORTING HER SUMMARY ON SPORTS WORLD IN **FREELANCE GRAPHICS**. THIS PRESENTATION WAS ROUTED AS A NOTES DOCUMENT SO OTHER INTERESTED PARTIES IN MARKETING, PRODUCT DEVELOPMENT AND EVEN OTHER SALESPEOPLE ON THE ROAD, LIKE DAVE, CAN QUICKLY ACCESS IT AT THEIR CONVENIENCE.

4 LUCY COMPLETES HER **1-2-3** EXPENSE REPORT FOR THE TRIP, WITH THE ESTIMATED EXPENSES AND THE CASH ADVANCE AMOUNT BEING AUTOMATICALLY ENTERED FROM AMI PRO TO 1-2-3 THROUGH THE NOTES/FX LINK. THE EXPENSE REPORT IS AUTOMATICALLY ROUTED TO HER MANAGER AND THEN TO FRED IN ACCOUNTING.

Lotus SmartSuite includes a powerful feature called Notes/FX™ that allows a unique field-level exchange between desktop applications and Lotus Notes. These links redefine the way people and all their applications work together.

Today, SmartSuite continues to lead Microsoft Office in many areas, including its range of applications, 1-2-3 data compatibility and common tools and features across the full suite of applications. And notably, in the technology for working together.

In short, SmartSuite is not just the smartest choice for the way people work right now, it's the only smart choice for the way people want to work.

SMARTSUITE INCLUDES FIVE FULL-POWERED WINDOWS APPLICATIONS: 1-2-3 RELEASE 4, AMI PRO® 3.01 WORD PROCESSOR, FREELANCE GRAPHICS® 2.01, APPROACH® 2.1 DATABASE AND ORGANIZER™ 1.1.

Get 1-2-3 plus 4 integrated business applications for just $299.* when you upgrade to SmartSuite 2.1 from any Lotus or qualifying competitive product. Visit your Lotus Authorized Reseller or call Lotus direct at **1-800-TRADE-UP, ext. 9407.****

Lotus
Working Together®

Working Together, 1-2-3, Ami Pro, Freelance Graphics, Approach, SmartSuite and Lotus Notes are registered trademarks, and Version Manager, Notes/FX and Organizer are trademarks of the Lotus Development Corporation. Windows is a trademark of Microsoft Corporation.

"Double Speed Multimedia Madness!"

Call Now for VIDEO GALAXY! Desktop Video!

Meld Sight and Sound Like Never Before!

Hotter than ever! Aztech Labs has the industry buzzing, and we're ready to jazz up your life. Join the Sound Galaxy Multimedia explosion and open your mind to a new era for your PC. In one exciting package Aztech Labs delivers the latest technology in MPC II compliant multimedia hardware with 21 new and powerful business and multimedia CD-ROM and software titles. From the roar of a T-Rex, to the melodies of Mozart, meld sight and sound with the "Ultimate Upgrade" from Aztech Labs!

5 Hot CD Titles are Included Software Toolworks™ Multimedia Encyclopedia, Battle Chess Enhanced CD-ROM, Space Quest IV, Macromedia Action, & Jones in the Fast Lane!

motorized loading tray, the finest on the market, is combined with the latest in business and multimedia software, including ComVoice, the next level in voice recognition software. Add high quality Powered Stereo Amplified Speakers, a Microphone, and as a special introductory offer, a **free CD Carrying Case** to make this the most complete package on the market. Buy Aztech's Wave-Table Synthesis upgradeable Sound Galaxy Double Speed Pro 16 Multimedia Upgrade Kit, and lead the Multimedia Revolution into the future!

The Ultimate in Technology Sound Galaxy 16-Bit boards support the MPU 401 MIDI interface standard and Wave-Table Synthesis!

Double Speed Pro from Aztech!

Sound Galaxy thrusts you to the head of the Multimedia Revolution with this hot package! The Sound Galaxy Pro 16L audio card with Sound Blaster Pro, Microsoft Windows Sound Source, and AdLib sound standard compatibility is the cornerstone of this fantastic kit. LMSI's high performance Double Speed CD-ROM drive with

Full Spectrum of Sound Galaxy Multimedia!

With 8-Bit mono to full 16-Bit stereo digital audio cards, WavePower Wave-Table Synthesis, and the a full range of Multimedia Upgrade kits, including the new Sound Galaxy Double Speed Pro 16 Multimedia Upgrade Kit, Aztech is the industry's multimedia compatibility leader! Join the "Double Speed Explosion". Visit your dealer today and insist on Sound Galaxy! For Dealer info call **800-886-8859**.

Wave-Table Synthesis Upgrade for Only $140.00 SPECIAL Coupon Inside FREE CD Case with Purchase

SOUND GALAXY

"Pioneering the Multimedia Explosion!"

A product of Aztech Labs, Inc.

MICROSOFT® WINDOWS™ COMPATIBLE

PC2 Multimedia PC

AZTECH

46707 Fremont Blvd., Fremont, CA 94538. U.S.A. Tel: (510) 623-8988 Fax: (510) 623-8989

© 1993 Aztech Labs, Inc. Aztech, the Aztech logo, and Sound Galaxy are trademarks or registered trademarks of Aztech Labs, Inc.
All other names are trademarks or registered trademarks of their respective holders. Specifications, terms, and services subject to changes without notice.

CIRCLE 318 ON READER SERVICE CARD

Bill Howard

Erasing Windows Pains

As Windows software gets better, you can't help but notice all the little things that still need work in Microsoft Windows 3.1 and in Windows programs. It's certainly better today than it was in the days of Windows 3.0, to say nothing of Windows 2.0 and Windows/386. You used to worry about how many times a day Windows would crash. Now you worry about why every multimedia application you own plays at wildly different volumes. I guess that's progress. Of sorts.

As a battered veteran of nearly a decade of running and rebooting Windows, I present my highly personal wish list for improving basic Windows usability.

A LITTLE WINDEX

When you want to open a file, an application typically presents a list of a filenames. But that's all you get. No information about how big the file is and no date stamp. Is that too much to ask? New Microsoft apps (Word for Windows 6.0 and Excel 5.0, for instance) let you view the associated file dates, but only after you go through three additional menus (Find File, Advanced Search, Timestamp) and then fill out starting and ending dates for your search. It's such a hassle that you never bother, and instead you open files by trial and error until you find the right one.

GET THERE, ALREADY

Then there's the on-screen size (too big) and the multiple levels (too many) of dialog boxes for things like printer setup. They take up too much space. I believe every dialog box, menu, or control panel should have an alternative, experts-only miniaturized version that includes all the controls on one level, but in one-half or even one-quarter the space. I don't mean the condensed or short-menu versions that take up less space by offering fewer commands. They're fine as a third option.

Once and for all, I'd like to see every vendor agree to use commas when listing file sizes. The app just told you that your remaining hard disk space is 32314867 bytes. Quickly now: Is that 32MB or 3.2MB?

I'd like to see Microsoft and video-board makers get together and design a really large font, so you could comfortably run 1,024- by 768-pixel resolution on 14- to 17-inch monitors. A few vendors do have large and standard font options, but they really should be called "too small" and "*way* too small."

ESCAPE HATCH

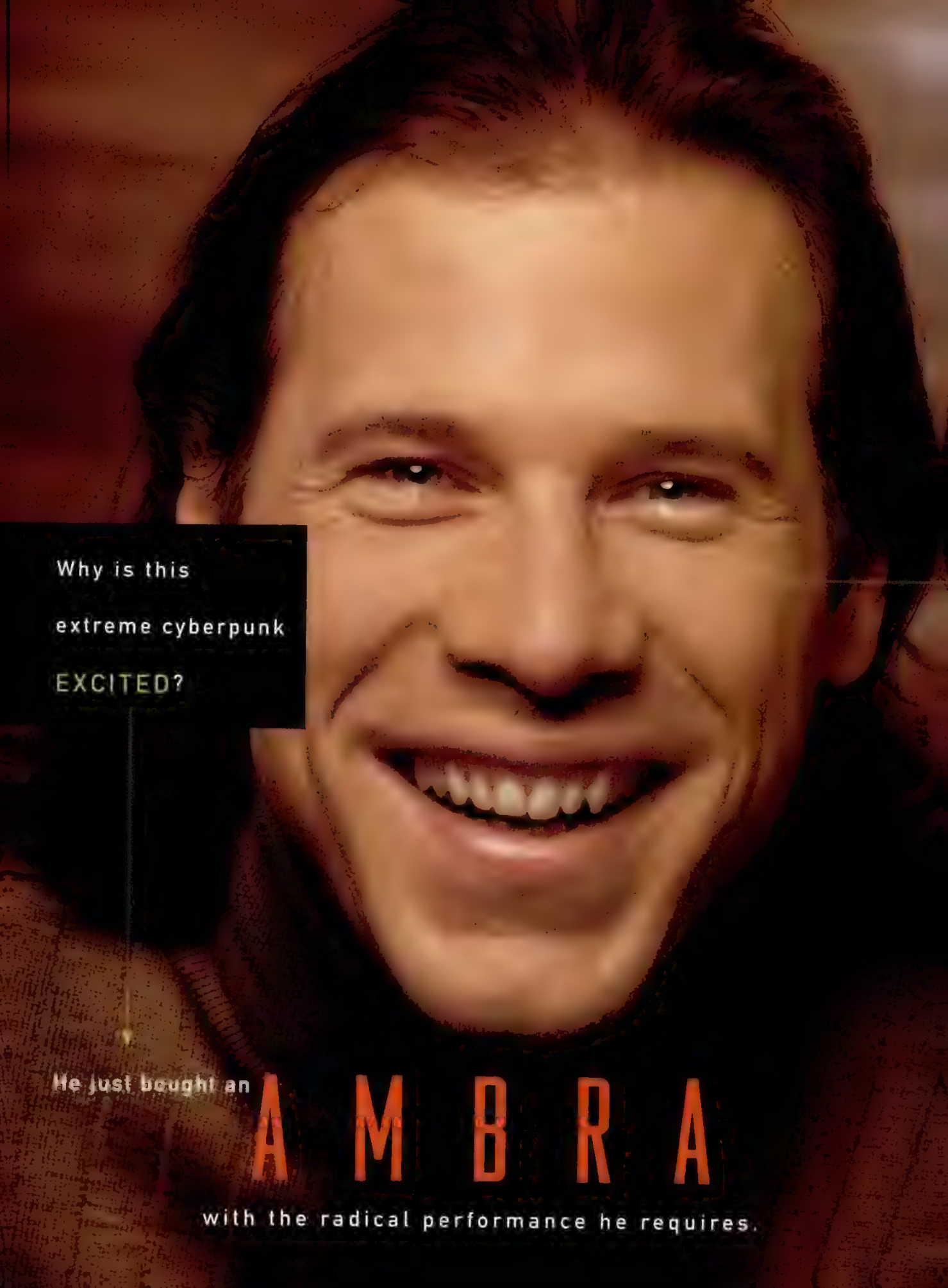
Finally, every program should have an uninstall routine that removes all traces of itself but doesn't wipe out libraries or dictionaries shared with other apps. Until then, get technical editor Neil Rubenking's superb utility, INCTRL.EXE, which reports what files were added or modified at installation. (To get a copy, download it from PC MagNet on CompuServe. Type Go:Tips to access the Utilities/Tips Forum, and download the INCTRL.ZIP file from PC Mag Utils [Library 2].)

To most of these complaints, Microsoft will probably say, "You could write a macro to do that," swiping the line Lotus made famous in the 1980s whenever users complained about something Lotus 1-2-3 should do readily. Sure, I could write a macro or a Visual Basic routine, but I shouldn't have to.

And shareware vendors will write and say, "There's a cheap shareware utility that adds exactly the functionality you're looking for." They tell you: Just go on CompuServe, type Go Starving Programmer Forum or StarProFor, browse for DOODAD.ZIP, download and unzip it, print the 220 pages of documentation, add it to your Ami Pro toolbar, and you're in business. Problem is, most users won't go to that kind of trouble. It's the kind of trouble I would rather avoid when I'm using Windows.□

Windows is better than it was nearly a decade ago, but there are still kinks we'd like to shake out.

Illustration by Nishan Akgulian


Why is this
extreme cyberpunk
EXCITED?
He just bought an
AMBRA
with the radical performance he requires.

Intel® Pentium™

- Superscalar architecture
- 100 MIPS
- 64-bit CPU-memory-cache data path
- Burst mode data transfer
- High-performance floating-point unit

PCI technology

- 132MB/sec throughput
- Multiplexing 32-bit CPU-peripheral data path
- Buffered expansion architecture
- Busmastering and concurrent option support
- Autoconfiguration of PCI options

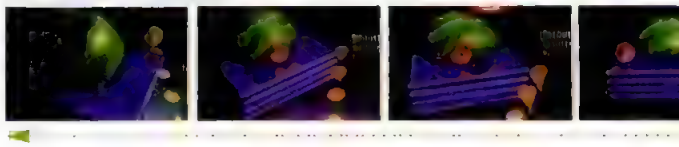
It all sums up to **workstation-class performance.**

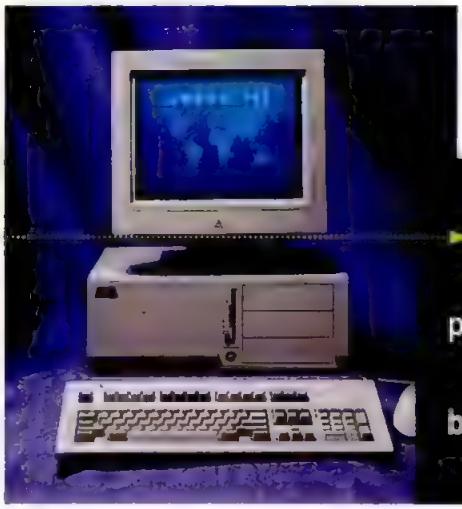
Yours, from AMBRA,™ at a **PC-class price!**

Add to this powerful platform high-capacity, high-speed storage — like a 1GB (8.5ms) hard disk!

And, for high-resolution graphics, rely on a PCI-based, 64-bit **MATROX MGA-II+ ACCELERATOR.** We're talking 50 MHz clock speed. Ultra-high, flicker-free 120 Hz refresh rates. Real-time CAD power drivers. Fast, full-screen video for Windows.™ And more!

90 million WinMarks[1]





If you have extreme ideas of high performance, say hello to AMBRA. We build computers so HOT, they're HYPER.

Sizzling multimedia for any system you choose!

Clock-doubling 486DX2 with optimized design!

Intel's DX2 processor provides 66 MHz internal clocking, which pays off in enhanced Windows performance for you. And that's just the beginning. Every computer in AMBRA's latest DX2-based series comes with these **built-in performance-boosting features:**

- 256KB direct-mapped WriteBack L2 cache for better hit ratio
- Local bus IDE controller (IDE cycles concurrent with CPU)
- Integrated 32-bit, high-performance local bus graphics accelerator
- Buffered serial ports for improved modem performance under Windows
- Multimode bidirectional parallel port

Super I/O!

With these DX2 systems, you can improve performance tomorrow!

- Upgrade to Pentium OverDrive™
- Move from VESA to PCI local bus
- Expand memory up to 128MB
- Add high-capacity drives: greater than 528MB IDE

AMBRA

1-800-200-1464

Count on AMBRA for HOT performance at a cool price — whatever your POWER class!

PENTIUM AND PCI TECHNOLOGY

❶ DP60/PCI
- Pentium processor, 60 MHz
- 64-bit CPU-memory-cache data path
- 256KB L2 cache
- 8MB RAM, max: 128MB
- 4 ISA, 2 PCI, 1 ISA/PCI slot
- 540MB (12ms) IDE hard disk
- 6 drive bays
- Fast PCI IDE controller
- PCI graphics accelerator, 2MB
- 14" SVGA color monitor, LR
- 3.5" 1.44MB diskette drive
- Lexmark™ PS/2®-style 101-key keyboard
- MS-DOS® 6.2, Windows™ 3.1, mouse

$2,669

❷ w/ Diamond Viper video plus...
- 16MB RAM
- PCI Diamond Viper graphics accelerator, 2MB VRAM
- 15" FST-NI color monitor, LR

$3,449

❸ w/ Matrox graphics and more!
- 16MB RAM
- 1GB (8.5ms) IDE hard disk
- PCI Matrox MGA II+ graphics accelerator, 2MB VRAM
- 2X CD-ROM drive
- 15" FST-NI color monitor, LR

$4,349

Optional onsite warranty from IBM: Just $29!

PENTIUM PROCESSOR W/ EISA/VESA

❹ DP60E/VL
- Pentium processor, 60 MHz
- 64-bit CPU-memory-cache data path
- 256KB L2 cache
- 8MB RAM, max: 64MB
- 6 EISA, 2 EISA/VESA slots
- 540MB (12 ms) IDE hard disk
- 6 drive bays
- Integrated 32-bit SCSI-2 controller
- 32-bit graphics accelerator, 1MB
- 14" SVGA-NI color monitor, LR
- 3.5" 1.44MB diskette drive
- Lexmark PS/2-style 101-key keyboard
- MS-DOS 6.2, Windows 3.1, mouse

$3,279

CD-ROM AND MULTIMEDIA KITS

Double-Speed Drive
- 2X CD-ROM drive
- Motorized tray
- Kodak PhotoCD- and multisession-compatible

$199

Double-Speed Blaster
- 2X CD-ROM drive
- SoundBlaster™-compatible 16-bit stereo sound card with CD-ROM interface
- 2 desktop speakers

$320

Drive and Sound
- CD-ROM drive
- Pro AudioSpectrum 16-bit sound card
- 2 desktop speakers

$179 (limited quantity)

Stereo Sound Upgrade
- Pro AudioSpectrum 16-bit sound card
- 2 desktop speakers

$159 (limited quantity)

DX2 66 MHz SYSTEMS W/ OPTIMIZED DESIGN

❺ D466I/VL
- 486DX2, 66 MHz
- Upgradable to Pentium technology
- 256KB WriteBack L2 cache
- 8MB RAM, max: 128MB
- 4 16-bit ISA, 1 32-bit VL bus slot
- Upgradable to PCI
- 440MB (12ms) IDE hard disk
- 5 drive bays
- 32-bit local bus IDE controller
- 32-bit local bus graphics accelerator, 1MB
- 15" FST-NI color monitor, LR
- 3.5" 1.44MB diskette drive
- 2X CD-ROM drive
- Lexmark PS/2-style 101-key keyboard
- MS-DOS 6.2, Windows 3.1, mouse

$2,419

❻ 466I/VL minitower, w/ all the above and:
- 16MB RAM
- 6 drive bays
- 7 16-bit ISA, 1 32-bit VL bus slot

$2,779

Special offer!

With every AMBRA system, you receive a complimentary "Try and Buy" software sampler on CD[2]. Plus, you can take your pick of business, home recreation or entertainment CD Packs — 5 discs for only $79.00!

Call for details!

In Canada,[3] call 1-800-363-0066, Ext. 1464

CALL 1-800

[1] Estimated PCI WinMarks scores based on previous Matrox testing of MGA-I using Ziff-Davis Winbench 3.11, Pentium 66 MHz, 64MB RAM, 512KB cache, 72 Hz, 1,024 x 768 x 256 colors. [2] CD-ROM drive required, may be purchased with system or separately. [3] Please call for details regarding AMBRA's money-back guarantee, limited warranty and optional IBM onsite warranty. Return shipping and insurance charges are the responsibility of the customer. Onsite service may not be available in certain locations. [4] Offerings may differ in Canada.

BLUE LIGHTNING BEST BUYS

❼ D466BL

- 486 Blue Lightning,™ 66 MHz
- Upgradable to Pentium technology
- 16KB L1, 256KB L2 cache
- 8MB RAM, max: 64MB
- 3 16-bit ISA, 2 32-bit VL bus slots
- 440MB (12ms) IDE hard disk
- 5 drive bays
- Integrated 32-bit SCSI-2 controller
- 32-bit graphics accelerator, 1MB
- 14" SVGA-NI color monitor, LR
- 3.5" 1.44MB diskette drive
- Integrated Ethernet 10BaseT
- Lexmark PS/2-style 101-key keyboard
- MS-DOS 6.2, Windows 3.1, mouse

$1,999

❽ BL minitower, w/ all listed features of ❼ plus...

- 6 16-bit ISA, 2 32-bit VL bus slots
- 540MB (12ms) IDE hard disk
- 6 drive bays
- 2X CD-ROM drive

$2,289

EXTRA-AFFORDABLE MODELS

❾ D466DXA

- 486DX2, 66 MHz
- Upgradable to Pentium technology
- 128KB L2 cache, max: 256KB
- 4MB RAM, max: 36MB
- 5 16-bit ISA slots
- 340MB (12ms) IDE hard disk
- 5 drive bays
- 32-bit local bus IDE controller
- 32-bit graphics accelerator, 1MB
- 14" SVGA color monitor, LR
- 3.5" 1.44MB diskette drive
- Lexmark PS/2-style 101-key keyboard
- MS-DOS 6.2, Windows 3.1, mouse

$1,739

❿ 466DXA minitower, w/ all the above and:

- 8MB RAM
- 440MB (12ms) IDE hard disk
- 6 drive bays
- 8 16-bit ISA slots
- 15" FST-NI color monitor, LR

$2,149

SLIM-PRICED SLIMLINE

⓫ S450DXA

- 486DX2, 50 MHz
- Upgradable to Pentium technology
- 128KB L2 cache
- 4MB RAM
- 3 16-bit ISA slots
- 240MB (15ms) hard disk
- 3 drive bays
- 32-bit IDE controller
- 32-bit graphics accelerator, 1MB
- 14" SVGA color monitor, LR
- 3.5" 1.44MB diskette drive
- Lexmark PS/2-style 101-key keyboard
- MS-DOS 6.2, Windows 3.1, mouse

$1,595

FIRM CONFIDENCE.

AMBRA COVERS YOUR COMPUTER WITH A 30-DAY MONEY-BACK GUARANTEE AND A ONE-YEAR LIMITED WARRANTY. AND, FOR JUST $29 A YEAR, YOU CAN PURCHASE AN OPTIONAL IBM® ONSITE SERVICE WARRANTY BACKED BY 10,000 TECHNICIANS COUNTRYWIDE![3] ALSO, YOU CAN RELY ON EXPERT TECHNICAL SUPPORT—TOLL-FREE, 24 HOURS A DAY, SEVEN DAYS A WEEK—REGARDLESS OF THE WARRANTY YOU CHOOSE.

FREE CUSTOMIZATION.

We'll custom-configure to your exact specs — with no extra service charge or delay.

Full convenience.
Our lines are open weekdays 8 am to 11 pm, weekends 10 am to 7 pm (ET). We accept major credit cards, as well as purchase orders from qualifying businesses. Pick up the phone today!

AMBRA™

1-800-2 0 0-1 4 6 4

©1994 AMBRA Computer Corporation. AMBRA is a trademark of ICPI Ltd. and used under license therefrom. The AMBRA logo and logotype are trademarks of AMBRA Computer Corporation. IBM and PS/2 are registered trademarks and Blue Lightning is a trademark of International Business Machines Corporation. Intel is a registered trademark and Pentium and OverDrive are trademarks of Intel Corporation. MS-DOS is a registered trademark and Windows is a trademark of Microsoft Corporation. Lexmark is a trademark of Lexmark International, Inc. All other product names are trademarks or registered trademarks of their respective suppliers. Offerings, prices and products are subject to change without prior notice. Prices do not include shipping.

Making On-Line Services Work for You

Getting on-line is one thing. But getting on-line and having it be a productive experience is another thing entirely. Services that are more balanced and new graphical front-end interfaces make all the difference.

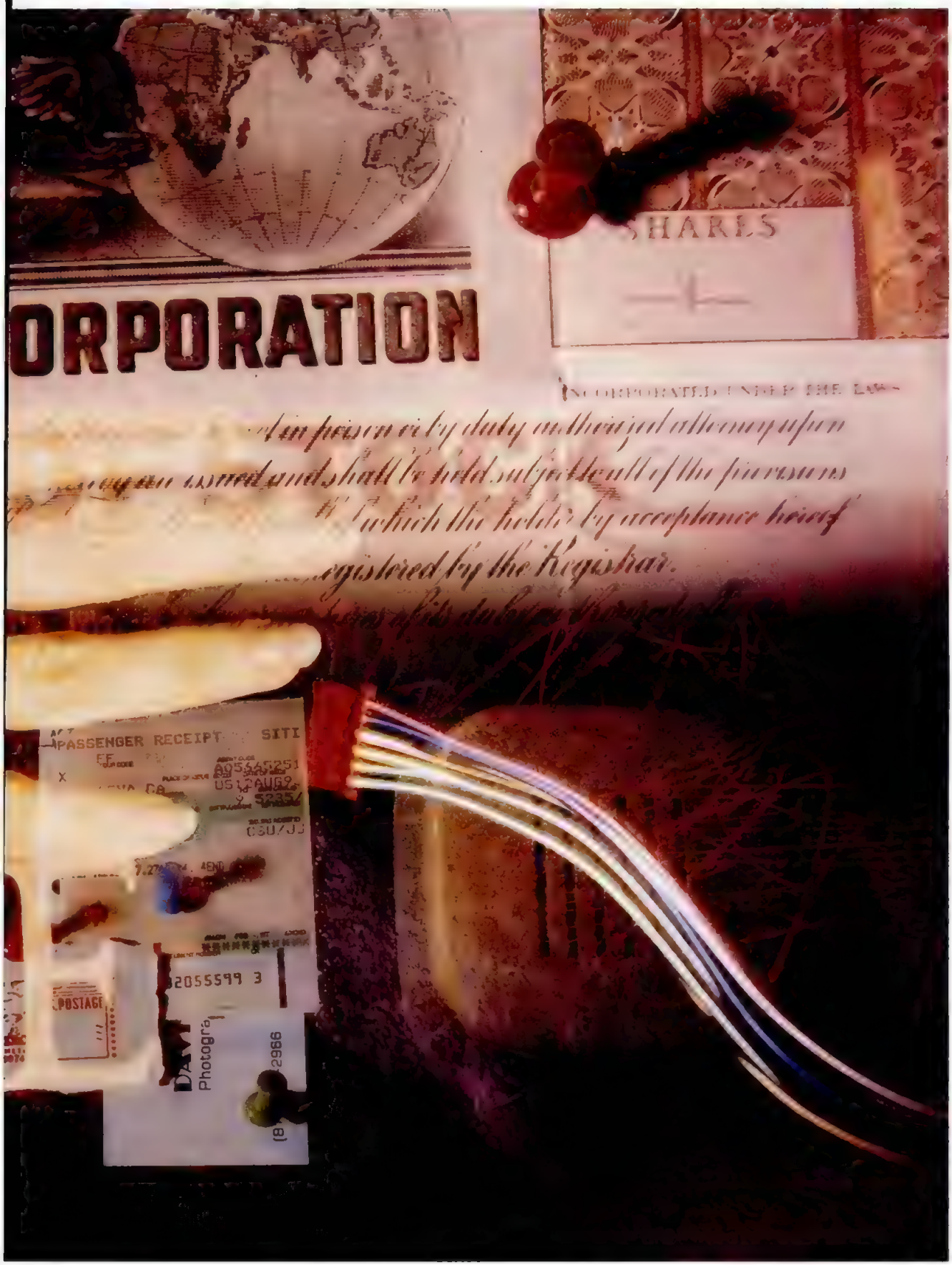
by Andrew Kantor

You've read the headlines in the major newspapers and weekly magazines. They all paint a romantic picture of an electronic frontier where "being wired" and "information surfing" are mind-altering experiences. There's certainly a great deal of truth to the notion that the on-line world can stretch your horizons. It's equally true that used well, on-line interactions can help you do business and be more productive.

The world of on-line services is vast. And it can be vastly expensive as well. Making smart connections—connections that put you in control of the information you want—is key to surviving in the on-line age, the information age.

Even more than the PC itself, the on-line world is a chameleon, changing its colors from moment to moment. You can move from tracking your stocks, to writing the president, to chatting with a group of eminent physicians, to troubleshooting a PC problem, to re-

Photography by Dennis Potokar


ORPORATION
PASSENGER RECEIPT
POSTAGE

searching NAFTA, to booking a flight for your next business trip—without ever disconnecting from your on-line service. How much time you spend, how much money you spend, and what forums you choose to participate in are all up to you. We can help by introducing you to the spectrum of services available and steering you towards their key differentiating factors.

IN THIS REVIEW

America Online.....126
CompuServe Information Service.....128
Dow Jones News/Retrieval with MCI Mail.....128
GEnie.....150
Prodigy Interactive Personal Service.....158
Internet: The Undiscovered Country.....116
A Private Little Board.....122
The Next Generation.....148
On the Front Lines.....153

JUMPING ON-LINE

You probably know the five major national commercial services by name: America Online, CompuServe Information Service, GEnie, Prodigy Interactive Personal Service, and Dow Jones News/Retrieval (which uses MCI Mail for its electronic mail)by subscribers. Each offers a unique blend of functionality and accessibility—a mix of e-mail, communications, and data and publications for access by subscribers. Each also carries its own pricing structure and choices in interface.

CompuServe, GEnie, and Dow Jones with MCI Mail are better equipped for business users whereas America Online and Prodigy offer a suite of services that probably are suited more to the home user. (See the individual reviews in this story.)

All of the services offer communications services and information that may be valuable. For instance, the forums on CompuServe are excellent resources for getting all kinds of questions answered fairly quickly. Hundreds of computer companies have forums established to answer queries, post software fixes and updates, and simply establish a presence there in support of their products. These are an invaluable source of information for busy IS professionals who do not have time to wait on busy support telephone lines, or who can just browse the forum and find answers to questions they haven't even thought to ask yet.

All of these services give you an opportunity to meet other professionals—that is, other potential business partners or collaborators, business resources of one kind or another, or even just other people interested in the same subjects you are. Other motivated on-line participants are tremendous sources for a wide variety of information.

An alternative to these commercial services is to use the resources of the Internet, the enigmatic worldwide network of millions of computers located at universities, government offices, research institutions, and corporate sites around the world. The services reviewed here all offer at least an e-mail gateway to the Internet. Many small, local bulletin board systems (BBSs) do that as well, and some are also connected to a loose network called FidoNet, which is based on late-night telephone contact between the sites.

Other services, such as Delphi in Cambridge, Massachusetts, offer direct access to Internet's resources. Many In-

HIGHLIGHTS

On-Line Services

MORE PEOPLE THAN EVER are using their PCs with modems to go on-line—through local bulletin board systems, on major services, or directly onto the Internet. Whether you're interested in business or leisure pursuits, chances are you'll find something on the electronic frontier.

COMMUNICATIONS is a compelling force for most people who go on-line. Electronic mail is the most familiar means. Mailing lists and bulletin boards allow several people to engage in a public discussion over days, weeks, or months. Real-time chat sessions let dozens of people hold a simultaneous conversation.

ON-LINE SERVICES OFFER ACCESS to a wide variety of communications and information tools. Larger providers carry news feeds from major services; libraries of newspapers, magazines, and journals; and encyclopedias and research works. In addition, software is available for downloading to your PC. Forums for users with special interests such as travel, art, and music abound.

THE FIVE MAJOR ON-LINE SERVICES are America Online, CompuServe, Dow Jones News/Retrieval, GEnie, and Prodigy. Although Prodigy claims the largest number of users, CompuServe offers the most of everything across the board. Users of America Online continually applaud its graphical interface. GEnie has an excellent range of third-party databases and libraries. Dow Jones News/Retrieval provides unequaled access to business-related news and information, and its gateway to MCI Mail gives it top-notch e-mail as well.

OTHER ON-LINE SERVICES cater to specific users. The ImagiNation Network, formerly Sierra On-Line, offers multiple-player games. ZiffNet, Ziff-Davis's on-line service, is aimed at computer users—with forums, databases, and downloadable software.

THE INTERNET is not a service, but an electronic network of computers that includes nearly every university, government, and research facility in the world, plus many commercial sites. The 7 to 15 million people with a connection have access to the libraries of all of its sources—from databases of the Department of Agriculture to census material to sports schedules and everything in between.

ternet servers have some data available to the public, and—simply because of its size—the Internet has a lot more of it than any of the commercial services.

Indeed, the depth of the information available from the Internet (once you learn to get at it) often surprises even the most seasoned professionals. In addition to the full text of some newspapers, magazines, and journals, you can find government data on population, agriculture, and the economy; research and scientific reports; and even more esoteric data, such as Supreme Court decisions and Space Shuttle schedules.

Keep in mind, though, that because the Internet is not a service, but a loose collection of computers, there is no guarantee that what you want is available, that you'll be able to find it, or that it will be accurate. Finding information means using one of several tools written for that purpose—or paying someone else to do it for you. Although software designed for searching the Internet has become easier to use and more sophisticated recently, it still has a long way to go to match the simplicity of searching a library on America Online or CompuServe. Each new generation of interfaces, however, is making the riches of the Internet more accessible (see "The Internet: The Undiscovered Country").

Another approach is to join a local BBS. Many local BBSs offer a good mix of e-mail and reasonably good services, usually with a local flavor and at a much lower cost than the commercial services. Other BBSs are subject-specific and have a broader geographical reach (see "A Private Little Board").

EDITORS' CHOICE

- **CompuServe Information Service**

All five of the major commercial services offer unique features that will make them attractive to some customers. For business users, however, CompuServe Information Service stands head and shoulders above the others; just make sure you use a front end to shield you from complexity.

America Online and Prodigy are aimed mainly at personal users. Both offer all the basics, including e-mail, discussion forums, news, an on-line encyclopedia, and travel and shopping services. America Online currently has the best native user interface of the systems we looked at, but we were disappointed in the quantity and quality of information available there. In contrast, while Prodigy's user interface is slow (and some will find the advertising distracting or annoying), the information there is more plentiful and more solid.

For business users in search of specific information, Dow Jones News/Retrieval can't be beat. It offers tremendous amounts of unique financial information, as well as databases on many other subjects. And through gateways to third-party services (including Dow Jones), GEnie users may well have the greatest single amount of information available. Both services offer unique information for those who need it, but because they are so expensive, they aren't for casual users.

CompuServe strikes us as the right on-line service for most people. It offers an amazing array of information, both for business users and those looking for hobby or entertainment information. It has excellent electronic mail, and the most comprehensive and active discussion forums in the business. In addition, it's a perfect way to contact vendors for advice and to get technical support. If there is one drawback, it's the outdated, command-based user interface—but this situation can be largely alleviated through use of a good front end, such as CompuServe Information Manager for Windows (WinCIM). CompuServe hasn't been as inexpensive as Prodigy or America Online, but it is much less costly than the other two professional services. And its prices are dropping. For the broadest array of information at a reasonable price, CompuServe is your best bet.

SELECTING YOUR SERVICE

Choosing among the five major commercial on-line services, like so much in computing, depends on your individual needs and preferences. You should consider the cost of the individual services you would like, how easy they are, and the specific communications and information features they offer.

Ease of use is particularly important, because before you can use the information these services have, you must first find it. Newer, graphical services, such as America Online and Prodigy, typically come with software for your PC designed to help you navigate. The business services, on the other hand, tend to have text-based native interfaces that require you to specify commands at a prompt. You get to these prompts through traditional communications programs, such as Crosstalk or Procomm Plus. While this approach can be fast, it's typically more difficult than most users want.

Fortunately, you can instead use communication packages that are specifically designed to help you navigate these services and manage your on-line communications. Many of these *front ends* also let you do some of your work, such as com-

Our Contributors: ANDREW KANTOR is a staff editor, RICK AYRE is an executive editor, ADAM A. HICKS is a senior editorial researcher, and BRENDON M. MACARAEG is an editorial researcher at *PC Magazine*. GARY GUNNERSON is the manager of information systems for a Fortune 500 publishing company. JOEL DREYFUSS is editor-in-chief of *Information Week*. GAIL SHAFFER was the associate editor in charge of this story.

posing and reading electronic mail, on your local computer, so you are *off-line*—not racking up on-line charges. Roughly 20 front ends are for CompuServe. About 8 front ends are available for MCI Mail. In addition, there are several enhancements to the standard Prodigy software now available, and GEnie users can use an alternative user interface called Aladdin, while waiting for the official GEnie for Windows, expected next year. (For more information, see "On the Front Lines.")

The information you'll find using the services varies dramatically. Most have a mix of general news and financial information; more specific databases, usually of interest to different kinds of businesses; hobbyist and entertainment information, such as movie reviews; and software available for downloading.

As business services, CompuServe, GEnie, and Dow Jones with MCI Mail offer the greatest range of facilities, typically at a premium price. CompuServe is the most robust, being particularly well suited for both small and large businesses. In contrast, Dow Jones with MCI Mail offers superior financial information and is the most targeted at the business market. With GEnie, users pay only a small monthly fee for basic services, and then hourly for the other services they use, making it a particularly smart choice for small businesses with smaller budgets and narrower needs.

The more personal services, America Online and Prodigy, are less expensive and have interfaces that are easier to use, but they lack the depth of information found in the professional services. America Online offers easier-to-use mail and bulletin boards whereas Prodigy tends to have more in-depth information and business services.

IT'S IN THE MAIL

In on-line services, communications include three areas: e-mail, discussion forums, and chat facilities. The most popular of these by far is electronic mail. In addition to letting you simply send a message, the services here provide various combinations of priority delivery, receipts, paper mail, faxing, and connections to the other networks and services. In many cases, you'll find that a particular front end makes creating and managing your e-mail much easier. (See the sidebar "On the Front Lines.")

All of these vendors make finding a user's address on that specific network easier through a "white pages"—an alphabetical listing of all the mail subscribers. America Online also lets you locate a user through keywords established in users' profiles when they sign up for the service.

One major difference among the services is whether and how they let you send files (such as applications, spreadsheets, photographs, or text files), as well as messages. Dow Jones—through its MCI Mail connection—lets you attach multiple files directly to a message. America Online, GEnie, and Prodigy let you attach a single file. CompuServe lets you send files, but they can't be attached to a message.

Another difference is in how the services treat already read messages. CompuServe, GEnie, Dow Jones with MCI Mail, and Prodigy will let users keep received messages on-line for a specific period of time, or store messages on their local PC via a front-end program. America Online, however, does not let you directly download e-mail to your PC, and

Suitability to Task: On-Line Services

In today's world, an on-line service shouldn't be a diversion or a novelty, but a full-fledged tool for making a company and its workers more productive. We've considered five ways these on-line services can improve your productivity. Unlike our coverage in past issues, our emphasis this time was squarely on the business and professional aspects of these services. Users interested in the more consumer and other non-business aspects of on-line should concentrate on the hobbies and entertainment section.

SUITABILITY TO TASK

Product Name

	POOR	FAIR	GOOD	EXCELLENT
E-mail and communications	●	○	○	○
File downloads	●	●	○	○
Information databases	●	●	●	○
News and finance	●	●	●	●
Hobbies and entertainment	N/A			

N/A—Not applicable: The product does not perform this task

E-mail and communications Sending e-mail is one of the most popular on-line activities. Besides sending simple text messages, a good e-mail system can handle binary-file attachments, priority delivery, and receipts to let you know that your message has been received. We also take into account the range, ease of use, and quantity of the service's bulletin boards or forums, paying special attention to how easy it is to read and post messages and follow discussions.

File downloads refers not only to the number of files and programs available for download, but also to the range of topics they cover, and how easy it is to download. A good service provides a straightforward search engine, a variety of titles to choose from, and frequently updated libraries.

A service's **information databases** are what attract many business users. Newspaper and magazine archives, financial and corporate histories, and data on subjects ranging from accounting to zoology make any on-line service a good substitute for even the most well-stocked library. The data should be easily searchable and accessible from both specific sources (*The New York Times* archives, for instance) and general sources (such as *Compton's Encyclopedia*).

Also appealing to businesspeople are the **news and finance** services on-line. Where do the news feeds come from? Beyond stock prices, what financial information is available? Is the news edited or straight off the wire? The better services provide more detailed information and less interference while also giving access to commentary and analysis.

Not everyone focuses on the business aspects of an on-line service; many enjoy the **hobbies and entertainment** sections. Besides basics like interactive chatting and on-line games, we looked at the kind of information available, from movie reviews to hobbyist discussion areas. Better services have more to keep their subscribers busy after hours, as well as from nine to five. We considered both quantity and quality of the services' special interest groups; those rated higher provided a balance between the two.

You Could Put All This Together For $3,023. Or Let Us Do It And Save $524.

The Compaq LTE Lite Solution Paq

Includes a Compaq LTE Lite 4/25 486 Notebook, 120MB Hard Drive, a 2,400-bps Data+Fax Modem with WinFax Lite software, AC Adapter, built-in auxiliary battery, NiCad Smart Pack, carrying case, preinstalled MS-DOS 6, Microsoft Windows 3.1, WordPerfect for Windows, Quattro Pro for Windows V.5.0, The Norton pcANYWHERE for Windows V.1.0, Lotus Organizer for Windows R.1.0., and CompuServe.‡

This is definitely not a do-it-yourself ad.

For a limited time, Compaq will deliver the acclaimed LTE® Lite 4/25 notebook right to your door, packaged with everything you need to become an instantly more productive individual. You'll save time setting up your system and loading software, not to mention over five hundred dollars.

This special Solution Paq™ offers an LTE Lite 4/25 Model 120 notebook preinstalled with WordPerfect for Windows,™ Quattro Pro for Windows, Lotus Organizer, and The Norton pcANYWHERE for Windows. You also get a Data+Fax Modem, a NiCad Smart Pack Battery, plus a carrying case.

LTE Lite 4/25 Features

25-MHz 486SL ◆ 4-MB RAM ◆ 120-MB Hard Drive ◆ 9.5" Monochrome VGA Display ◆ 3½" 1.44-MB diskette drive ◆ Power conservation and security features ◆ Preinstalled MS-DOS® 6 & Microsoft® Windows 3.1 ◆ Auxiliary Battery ◆ AC Adapter ◆ EZ Help On-Line Library ◆ Integrated Trackball ◆ Expansion Base Connector

It's set up and ready to run the moment you open the box. And by simply sliding the LTE Lite notebook into the optional Compaq Desktop Expansion Base, you have a full-function desktop computer. You also get unsurpassed Compaq quality, including a free three-year warranty† and 24-hour hotline support.

There's never been a better value on the notebook you really want. So don't wait until they're all gone. Call to order your LTE Lite Solution Paq today.

True, you won't get the gratification of assembling it. But with $524,** you can buy a lot of model airplanes.

COMPAQ DirectPlus

1-800-888-0116

Mon-Fri 7-7 (Sat 10-4) CST
Ask for our new free catalog

*Leasing is provided by GE Capital Services for a term of 36 months, and is subject to approved credit and certain terms and conditions. Call for details. **Savings based on individual prices †Restrictions and exclusions apply. Monitors, battery packs and certain options are covered by a one-year warranty. ‡CompuServe preinstalled with 30-day free trial membership. ©1993 Compaq Computer Corporation. All rights reserved. Compaq, the Compaq Logo and LTE are Registered U.S. Patent and Trademark Office. Compaq DirectPlus and Solution Paq are service marks of Compaq Computer Corporation. Products, prices and programs are subject to change without notice. Other products are trademarks or registered trademarks of their respective companies. Microsoft and MS-DOS are registered trademarks and Windows is a trademark of Microsoft Corporation. The Intel Logo is a registered trademark of Intel Corporation. Offer available in the U.S. only

Internet:
The Undiscovered Country

by Andrew Kantor

The Internet is a hot topic. It has been seen on the front page of all sorts of newspapers and on the covers of national magazines. It has even been the topic of cartoons in *The New Yorker.*

But what is the Internet, really? Does it have value as a business tool? Should you use it? You can find lots of people anxious to tell you about the Internet, but precious few who can tell you how to use it effectively.

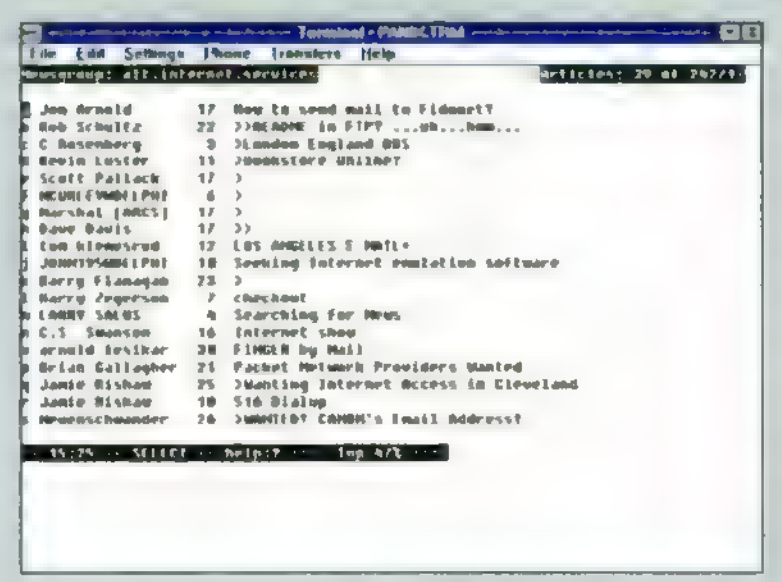
The Internet is a loose collection of millions of computers at thousands of sites around the world whose users can pass along information and share files no matter which of those computers they're using. Imagine an office network on a grand scale—with thousands of computers and terabytes of data instead of merely megabytes (a terabyte equals a million megabytes). But unlike an office network, there is no central authority on the Internet. The administrators have simply agreed to have their computers speak the same transmission language: Transmission Control Protocol/Internet Protocol (TCP/IP). That agreement has spawned a worldwide web of computers that are all connected.

The Internet was not designed for the business user but was intended to serve the research and academic communities. Lately, though, business people, as well as government workers, educators, and just casual computer enthusiasts have been traversing this web. They have at least one thing in common: They search among the millions of pages of electronic data for the few bits that they want or need.

FROM THESE HUMBLE BEGINNINGS. . .

What is now the Internet began as an experiment to test the possibility of creating a disaster-proof nationwide computer system where scientists and military personnel could share messages and data no matter where they were. In the late 1960s, the United States government connected four computers in California and Utah using what was then a new networking technology, called packet switching.

It worked. Users on these computers could send messages to and share files with other users almost instantaneously. The original project, called the ARPAnet, after the Advanced Research Projects Agency, which supervised the project, grew gradually for a long time, adding new computers and users at government and university sites.



From the alt.internet.services Usenet newsgroup. Listed are the writer's name, the length of the posting, and the subject of the article.

From the mid-1970s to the 1980s, smaller networks that used the ARPAnet technology, such as NSFnet, run by the National Science Foundation (NSF), decided to work together or *internetwork.* They started sending information to one another across special high-speed telephone lines, with the ARPAnet as the core. By the 1980s, this *internetwork* of computers reached not only across the country, but around the world. Today it links government, university, college, research, and commercial sites, and is known around the world simply as *the Internet.*

No one person or group runs the Internet. Much of its direction, however, comes from a group of volunteers called the Internet Society, which is run more like a council of elders than a business. Two major subgroups of the Society are the Internet Architecture Board (IAB), which focuses on producing interconnection standards, and the Internet Engineering Task Force (IETF), which concerns itself with technological developments and their impact on the Internet. These volunteer groups hold public on-line discussions, where Internet users register their opinions and try to create standards for the Internet community. (Membership in the Internet Society is $70 annually for an individual.)

Similarly, no one organization collects fees from Internet users or networks. Each individual user and service pays its own way. The NSF still pays for NSFnet, and NASA pays for the NASA Science Internet. Many university and commercial sites maintain their own computer systems; some pay a regional network or national provider for their data connections. Some sites are supported by private grants, others by government funding. Somehow it all works.

And it all grows, too. In fact, Internet growth is phenomenal. Reports released at the Internet World '93 conference held in New York this past December put the Internet global population at 15 million, with 150,000 new members joining every month.

INFORMATION EVERYWHERE

You can find every conceivable kind of information on the Internet. The business user might be interested in infor-

mation on—and copies of—GATT (General Agreement on Tariffs and Trade), NAFTA (North American Free Trade Agreement), or the Maastricht Treaty. You can find demographic statistics, consumer news, or copies of the Japan Economic Newswire. Using the Internet, you can even connect to, say, the United States Department of Commerce's Economic Bulletin Board.

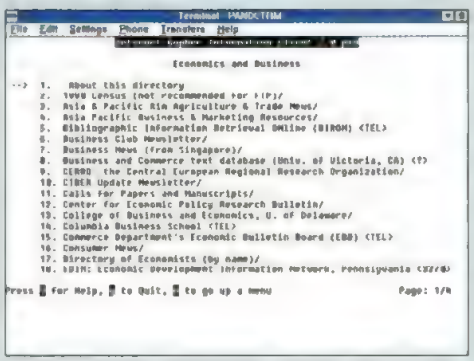
Not only are there news wires and databases of all kinds, there are mailing lists and discussion groups of regular users, along with experts in all walks of life, who gather electronically to contribute additional information and debate its merits.

Electronic mail is the mainstay of the Internet. It works like regular postal mail, but it's faster and—if you send more than a few messages a month—it's cheaper too. Each site on the Internet has a unique name, such as panix.com (for the commercial system Panix in New York), or unix.cc.emory.edu (for the Emory University computer center's Unix system). Each user at each site has a user name, so the entire address reads something like *president@whitehouse.gov* (pronounced "president at white house dot gov"). And many systems that offer little in the way of Internet access, such as CompuServe or Prodigy, at least have mail gateways for users to send or receive Internet mail.

Electronic mail lets you reach a lot of people at once through *mailing lists*. Mailing lists are like forums—groups of people who share an interest, such as steel production, or Ray Bradbury books, or medical research, for example. When you subscribe to a list, rather than sending a message to individual users, you send it to the list. Your message is automatically copied to all the other subscribers, and you get a copy of whatever they write. It's a crude but effective cross between a chain letter and a shouting match.

Aside from e-mail and mailing lists, the Internet has another method of fostering communications and discussion. Called Usenet News, it is the Internet's equivalent of bulletin boards. If you participate, you will have at your disposal "newsreader" programs, with names like rn, nn, or trn (for read news, no news is good news, and threaded read news).

You can subscribe to newsgroups and post messages and replies to more than 4,500 bulletin board–like groups around the world. These are divided into topic areas that include biz (for business postings), comp (for computer-related), and alt (a variety of miscellaneous topics and social issues). Individual boards have names like *alt.movies* or *comp.lang.c++*.



Gopher is one of the Internet's easiest navigational tools to use. Users explore by making selections from a series of numbered menus.

Users can join as many newsgroups or subscribe to as many mailing lists as they like, but most find that keeping up with even a few is time consuming. The problem is that hundreds, or thousands, of messages a day are posted in the most popular groups or lists. Your mailbox can fill quickly.

Think of mailing lists as magazines—you subscribe and unsubscribe as your needs and interests change. Then newsgroups are like television stations: They are always there, and you can flip through them, deciding at a glance whether you want to read what you see.

SIGN ON

To use the Internet, of course, you must first be connected. There are a few ways to accomplish that.

First, you can be directly connected to one of the networks that constitute the Internet. Most universities, and more and more companies, have direct Internet connections, often through connections to a major access provider such as Performance Systems International (PSI) in Reston, Virginia. This is an expensive solution, requiring, among other things, a router and a leased T1 or T3 link, but it does give you complete control over your access. This includes your site name, what tools you will have available, and which newsgroups you will make available to users.

A more cost-effective method may be to find one of the country's hundreds of dial-up providers, which will provide you with an account or group of accounts. Once established, you dial in to the provider's computer, which is attached to the Internet (and which typically runs Unix). Dial-up providers usually charge under $25 per month for an account, and, in the Internet tradition (which most adhere to), most make the fee a flat rate. That means there are no additional charges for the number of e-mail messages you send or the amount of time you spend on-line.

You can also access the Internet indirectly, through gateways provided by the big commercial services (the focus of this article). America Online, CompuServe, Dow Jones/MCI, GEnie, and Prodigy all offer at least e-mail exchange with Internet users. America Online, CompuServe, and Prodigy both plan to allow you to subscribe to mailing lists, join news groups, search databases, and transfer binary files sometime this year.

LOOKING AROUND

Getting connected is the easy part. Finding what you need is hard. Because the Internet was built by and for sophisticated computer users it hasn't had the benefit of the kind of tools most business users have come to appreciate on their own computers. Still there are some tools that work for Internet users, and some emerg-

Continues

Internet

CONTINUED

ing tools that hold promise.

If you are looking for a specific file on the Internet, start with archie. Archie depends on archie servers, which keep a frequently updated record of what's available on every Internet computer. In fact, these servers are really big indexes, and archie allows you to search across them for the file you want.

Like any search tool, archie takes practice. But the Internet is so dense that you probably will have special problems. For example, if you want information on Lotus Improv you'd better be specific. Searching on just *Lotus* will turn up everything from Lotus tech notes to information on yoga positions.

Once you find a file using archie you can typically retrieve it using another tool called File Transfer Protocol (FTP). FTP lets you use a series of Unix commands to navigate through the remote computer, find the correct file, and retrieve it. You have to know the correct series of Unix commands, but the tool does work.

The archie/FTP combination is good for experienced users, or for users searching for a specific file or files. But when you are searching for a topic area or just browsing, Gopher and the World-Wide Web (WWW) are better. These navigators let you browse, in an orderly fashion, through millions of files stored on the Internet using a series of menus. Gopher uses a direct, topic-to-topic approach. A search tool called VERONICA allows you to search *Gopherspace* for information, making the two a powerful combination. Alternately, WWW links specially designed hypermedia documents, as well as Gopher directories, FTP sites, and even newsgroups. It's rapidly becoming one of the most popular tools on the Internet.

If the information you need has been indexed in a database, a program called WAIS (Wide-Area Information Server), developed by Thinking Machines, will let you search first for appropriate databases and then for information within them. The last of the major Internet tools is telnet, which is not so much a tool as a way to access them. Telnet lets you attach to any other computer on the Internet to run programs, search databases, or just log on to a personal account you have there.

Although all of these tools are functional, they are not user-friendly. It would appear, though, that the next generation of Internet tools is about to emerge. One new Internet navigator that *is* friendly is Mosaic, a free software program that was developed by the National Center for Supercomputing Applications. It's available for download from the Internet.

All of the Internet search tools are functional, but they are not user-friendly. However, the next generation of tools is about to emerge.

There are both Windows and Macintosh versions available of Mosaic, and they sport the kind of point-and-click interface people have come to expect in their software. Unfortunately, Mosaic will not work through simple Internet gateways, such as those offered by CompuServe or MCI. Instead, it requires a direct Internet connection, or a dedicated high-speed phone line.

Ironically, right now, some of the best tools for using the Internet are books and newsletters about it, because the more you know before you start, the less time you'll spend once you go on-line.

For newcomers, John Levine's *The Internet for Dummies* (IDG Books, 800-762-2974) provides an excellent introduction to the Internet itself and the various tools used for reaching it. A step up is Ed Krol's *The Whole Internet User's Guide & Catalog* (O'Reilly & Associates, 800-998-9938), and a good reference to keep handy is Daniel Dern's *The Internet Guide for New Users* (McGraw-Hill, 212-512-2000). Business users will appreciate Mary J. Cronin's *Doing Business on the Internet* (Van Nostrand Reinhold, 800-842-3636). Also recommended are *The Internet Letter* (Net Week, 800-638-9336), and *Internet World* magazine (Meckler Corp, 800-632-5537).

Unfortunately, there's no general catalog of information on the Internet; you'll have to search for what you want. Searching involves learning and using one of the Internet's search tools we've just described, or paying someone up to $100 per hour to do it for you. There's no guarantee you'll find what you want, either. On a commercial on-line service, profit motive provides continuous pressure to keep data plentiful and approachable; on the Internet the information you find is there only because of someone's good will.

All of the hype and the increased popularity that has resulted may drive the development of the kind of software tools business users need to use the Internet effectively. Or, they may kill it. Despite the fact that the Internet is, according to Peter Lewis in *The New York Times*, "about as easy for a novice to use as traveling a muddy road on a pogo stick with signs written in Unix," traffic is way up, and as a result the system has begun to slow down noticeably, especially during business hours.

The Internet does not bill for use, and there is no built-in way to keep track of its users. How well the Internet adapts to this explosion of interest will likely determine if it can indeed act as an on ramp to the national data highway, or whether it will be just another bypass. □

THE DECISION FOR THE RIGHT SIDE OF YOUR BRAIN.

WordPerfect 6.0 for Windows The latest version.

THE DECISION FOR THE LEFT SIDE OF YOUR BRAIN.

Lotus 1-2-3 for Windows R.4.0 The latest release.

THE DECISION THAT'S A NO-BRAINER.

The latest from Compaq DirectPlus: The ProLinea 4/33s Total Solution Paq.
$1,699 or $61 per month†

The Total Solution Paq includes the new Compaq ProLinea 4/33s with 4MB RAM, 120MB Hard Drive, a Compaq 1024 Color Monitor (1024 x 768 non-interlaced), a 2,400-bps Data+Fax Modem with WinFax Lite software, preinstalled MS-DOS 6, Microsoft Windows 3.1, WordPerfect 6.0 for Windows, Lotus 1-2-3 for Windows R.4.0, ReachOut Remote Control communications software, TabWorks and CompuServe

Whether you work logically or intuitively, Compaq DirectPlus™ has the perfect answer to your computing needs.

A complete ready-to-use package, the Compaq ProLinea™ 4/33s Total Solution Paq™ combines the latest versions of WordPerfect and Lotus 1-2-3 with the latest version of our acclaimed ProLinea PC, the 4/33s. This high performance desktop is 30 percent faster than 486SX/25 machines, to handle word processing, spreadsheet and database applications with ease.

ProLinea 4/33s Features

- 33 MHz 486SX
- 4MB RAM
- 120MB Hard Drive
- 3½" 1.44MB Diskette Drive
- Compaq Color Monitor
- Local Bus Video with 1MB Memory
- Preinstalled MS-DOS® 6 & Microsoft® Windows™ 3.1
- Compaq Mouse
- 3-Year Warranty

The Compaq Total Solution Paq also includes a 2,400-bps Data+Fax Modem that lets you send and receive directly, as well as access CompuServe.†† The Compaq ProLinea 4/33s is backed by our free 3-year warranty.† And a free technical assistance hotline is available every hour of every day.

So don't wait. Get everything you need with one decision: call Compaq DirectPlus. And conserve your brainpower for the sort of thing that really requires it. Like running your business.

intel inside

COMPAQ DirectPlus
1-800-888-0116
Weekdays 7-7, Sat 10-4CST.
Ask for our new free catalog.

*Leasing is provided by GE Capital Services for a term of 36 months and is subject to approved credit and certain terms and conditions. Call for details. †Restrictions and exclusions apply. Monitors, battery packs and certain options are covered by a one-year warranty. ††CompuServe preinstalled with 30-day free trial membership. ©1993 Compaq Computer Corporation. All rights reserved. Compaq and the Compaq Logo Registered U.S. Patent and Trademark Office. ProLinea is a trademark and Compaq DirectPlus and Solution Paq are service marks of Compaq Computer Corporation. Products, prices and programs are subject to change without notice. Other products are trademarks or registered trademarks of their respective companies. Microsoft and MS-DOS are registered trademarks and Windows is a trademark of Microsoft Corporation. The Intel Logo is a registered trademark of Intel Corporation. Offer available in the U.S. only.

only lets you store messages on-line for up to seven days after you last read them.

All of the services except GEnie let you send a mail message to a mailing list of multiple users on the service. America Online and CompuServe both offer native address books to store and reference e-mail addresses of people you contact frequently. MCI Mail, GEnie, and Prodigy do not offer an address book natively, although you can store these in front-end software. And note that CompuServe's address book is not compatible with the address book in WinCIM, perhaps the most important front end, which CompuServe itself sells.

A NEW WAY OF TALKING

Just a step beyond e-mail discussions lies the other mainstay of on-line communications: the electronic BBS. Just like its more traditional namesake, an electronic bulletin board lets you post messages for anyone to see and, of course, reply to. Through a BBS a user can post a message making a statement or asking a question. Other users reply, creating a list of messages and answers.

These bulletin boards have become a powerful tool for improving vendor responsiveness. As forums for questions and answers, they have been adopted extensively by computer industry vendors and are what have encouraged many users to turn to their chosen on-line service before calling for technical support.

On larger systems with more users, an answer to even the most technical question may be only minutes away. Moreover, it isn't only the computer giants like Microsoft, Novell, and WordPerfect that maintain forums. Many smaller vendors—such as Actix (maker of graphics hardware) have discovered that having an on-line presence, either on a service such as CompuServe or their own local BBS, means better support for users.

By posting driver updates, software patches, and frequently asked questions and answers (called FAQs), vendors save technical support time and leave room on the voice lines for more urgent problems.

All of the services listed here have collections of BBSs, called variously forums, clubs, or RoundTables (RT), each dedicated to one major topic. The *PC Magazine* Editorial Forum on ZiffNet on CompuServe, for example, has sections for discussions of software, hardware, networking, and trends, for example. Within the software area, you might find that users have created specific discussion topics on word processors, spreadsheets, and so on.

The services each use one of two general methods for organizing the dozens or even hundreds of sequential replies that can routinely appear in their forums. America Online and GEnie use a *chain* metaphor for these lists, with each posting following sequentially from the posting before it. Others, including CompuServe and ZiffNet use a *thread* system, in which discussions can branch off in several directions, with separate simultaneous conversations resulting from the various replies. Chain systems are much easier to follow, whereas threaded versions tend to support more robust conversations.

Electronic bulletin boards have been adopted extensively by computer vendors—and they are what compel many users to go on-line.

How effective are these forums? Very. For example, during the Soviet coup attempt of 1991, students in Moscow were posting events to the Internet several hours before people watched them on CNN.

Another popular feature, particularly among non-business users, is the chat function, essentially an immediate, interactive on-line conversation. Chatting, in its various forms, means sharing your screen with perhaps dozens of other users, one line at a time. When you enter a service's chat area or *room*, everything you type will be echoed on the screens of everyone else in that room. In chat areas, you can try to solve business problems, just go to meet people, or even hang back and listen.

FACTS ON FILE

Communications is only one part of what it means to be on-line; information is the other. There are general information areas in which these on-line services compete, including news, publications, software, databases, travel, and shopping.

Each of the services includes information on general news, stocks, financial markets, sports, and weather. Most of them take information directly off of news feeds from the major wire services. CompuServe gets its news from the AP wire. GEnie uses Reuters. America Online uses Reuters and UPI. Dow Jones has a range of services including market reports and analysis, futures prices, and stock information from its parent company, publisher of *The Wall Street Journal* and other business publications. Prodigy, instead of directly offering the news wires, takes news off AP and UPI and edits it for its subscribers.

The busy executive will benefit from the news "clipping" services offered by CompuServe, Dow Jones, and GEnie, which find all articles on the different news services that contain user-specified keywords such as *Novell* or *tariff*, letting you browse through the results off-line and at your leisure. Clipping services can save you lots of time reading through dozens of magazines.

All of the services except Prodigy offer full-text retrieval for a variety of publications, typically for an extra fee. GEnie and CompuServe both include access to Dialog, a service that contains the full text of hundreds of publications. ZiffNet, an extra-charge service available on both CompuServe and Prodigy, includes Magazine Database Plus in its CompuServe version. This includes full text of 136 publications, from *Aging* through *World Press Review*, including most of the major computer magazines, for an additional fee. America Online's offerings include , *The Atlantic Monthly*, *Omni*, and *Time* magazines. Dow Jones carries hundreds of newspapers, magazines, and journals. Currently, all of these services are limited to only the text of these articles, not the graphics, although that may change in the future with new transmission technologies.

All of the services offer on-line encyclopedias. Unlike printed or even CD-

(America Online)

(America Online is not really a pair of glasses, it is an online information service.)

A Private Little Board

by Brendon M. Macaraeg

Gone are the days when all you could expect from local bulletin board systems (BBSs) was a handful of message conferences, a few hundred shareware files, and a dull interface. Today's BBSs offer an abundance of reasons to sign on and subscribe, including quality information, gigabytes of shareware, and unique on-line community atmospheres.

It's pretty easy to connect to a local board, too, and listings are available from several sources. In print, *Boardwatch* magazine and *Computer Shopper*'s Online section provide lists by area code of local boards across the country. *Computer Shopper* also makes a version of its list available on ZiffNet as a Windows Help file (GO ZNT:SHOPPER, download the file BBS.ZIP). In addition, the Hayes Online BBS maintains the Darwin database of systems nationwide (set your modem to N-8-1 and dial 800-874-2937).

If you're new to the on-line world, a local BBS is a great place to familiarize yourself with sending e-mail, downloading files, and navigating an on-line system. And unlike a major service, when you're on-line on a local board and get confused about what to do next, you can often page a system operator, who can easily jump in and walk you through a process.

SAVE YOUR QUARTERS

BBSs are generally much less costly than the major services; subscription fees often run less than $20 per month. Some are free. Compare that with a major service where you can rack up charges of $50 in one week. And don't equate low cost with lack of quality; just the opposite is often true.

Looking for good services and information? BBSs provide plenty of it. Business-oriented boards offer updated stock quotations. Job seekers can call local boards that maintain online résumés accessed by companies around the country. Movie buffs can keep up with the latest casting calls and projects of their favorite stars and directors. Just name it, and there's a board in your area of interest.

BBS forums can also help with your computer woes. Where can you buy a new battery for your laptop? Check with other users in a laptop conference. Thinking of buying a CD-ROM drive? Scan the messages in the multimedia or CD-ROM forums to see what's hot and what's not. A large BBS will have forums like this, and then some. Even smaller boards can help. It's a case of guilt by association: Your fellow members are computer users too, and one of them can at least offer a hint or pointer to where you can look for help.

On the horizon for local BBSs looms the Internet. As the world-wide computer network gains in popularity (see "The Internet: The Undiscovered Country"), connections to it will be more in demand, and local boards will provide them at a better price than the big boys do. Many BBSs already offer connections, with everything from e-mail to sophisticated navigation tools.

Local BBSs will continue to thrive and be an attractive option to the major services because of their ability to adapt to rapidly changing technology. The major services offer shareware, but BBSs can often offer much more with online CD-ROM carousels. The major services are also limited to upgrading their technology because of extensive testing and cost, while BBS sysops can upgrade literally overnight to faster, better modems.

Like supermarkets, the major players dominate the on-line world. But there's always a place for the corner grocer. □

ROM–based encyclopedias, these are updated quarterly, so they are always current. At an additional cost of up to around $15 per hour, on-line encyclopedias can be a good choice if you're looking for more current information than available in a printed version, or if you use an encyclopedia infrequently.

Each of these services also allows you to make travel arrangements on-line. All offer American Airline's EAAsy Sabre, arguably the easiest of the travel services to use. CompuServe also offers the Official Airline Guide (OAG) and TravelShopper.

Finally, several of the systems offer other, more specialized kinds of information that may fit your needs perfectly. For instance, Dow Jones offers a wealth of financial data, while GEnie offers census data, patent applications, and more through its gateways.

DOWNLOAD HEAVEN

Another huge on-line resource is software available for download. All of these services except Dow Jones have this feature. Free and shareware titles—programs you can use for a specified amount of time without paying (usually around 30 days)—have found their niche, spread from system to system by satisfied users and the programmers themselves.

Name a category and you can find it: word processing, accounting, drawing, databases. Enhancements to existing products also abound: macros, templates, additions, plus files of hints and tricks. All of the services let you search through their library or libraries by keyword, or browse through sections devoted to particular topics—personal information managers, for example. You'll be happy to know that the once well-publicized risk of viruses has all but disappeared, thanks to sophisticated scanning programs integrated into the services.

CompuServe has the most software available for download. America Online has the nicest search capability, allowing users to find files by searching on titles or keywords from a single screen.

YOU'LL NEVER LOOK BACK

You've undoubtedly heard a lot lately about the coming "Information Super-

(CompuServe)

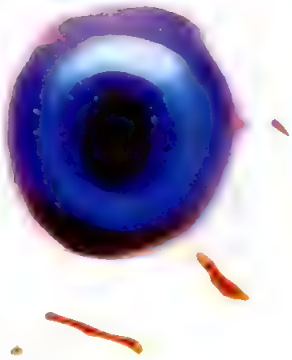
(CompuServe is not really a pair of glasses, it is an online information service.)

What we're trying to say here is this is not your father's online service. This is GEnie.® And if you want to have some real fun, this is where you belong. Because no other online service has more cool stuff to do, or more cool people to do it with. And there's something new every day. So get on GEnie now. You won't believe your eyeballs.

Blah, blah. Blah. Blah, blah...

Gab, gossip, babble, ask, tell, question, answer, confirm, deny, agree, debate, scream, whisper, say something, say anything. GEnie chat. The one and only.

Explore strange new galaxies, seek out new life and new civilizations, or better yet, just hang out with people like you and talk about it. We've got RoundTables you'll actually care about. Science Fiction, comics, electronics, Mac, God, White House, motorcycles, MIDI, soaps. It's a cool world if you know the right people.

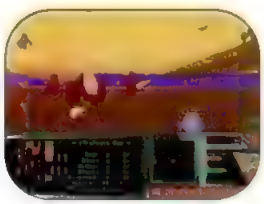


200,000 Files

Over 200,000 files to download. Games, graphics, sounds, text and then some. If that's not enough to keep you busy, you need to get out more.

(GEnie)

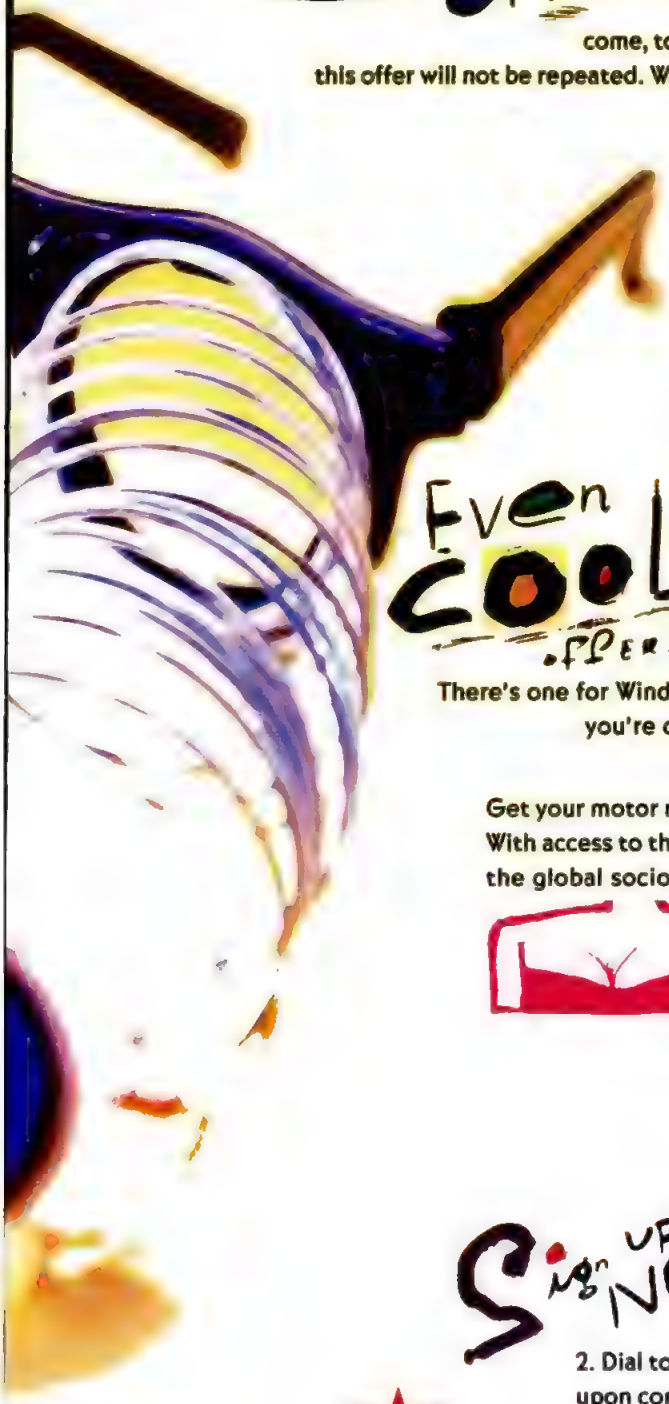
If you're having a problem with your computer, you can talk with one of our experts. And if that doesn't help, just give it a good swift kick. Hey, it could work.

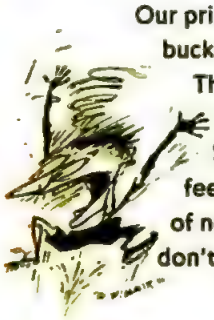


Kick butt in CyberStrike,™ winner of *Computer Gaming World's* 1993 On-line Game of the Year Award. Want more butt-kicking? Try Air Warrior® or MultiPlayer BattleTech.™ Less butt-kicking? How about GemStone III,™ the fantasy role-playing adventure. No butt-kicking? Okay, we'll get back to you.

Cool offer

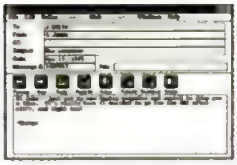
Join GEnie® Services now, and we'll give you credit against GEnie service charges in an amount up to whatever you spent on your competitive online service in the entire month of October 1993.* And if you can't bear to part with your old pals, they can come, too. Just tell them no pocket protectors. Incidentally, this offer will not be repeated. We want new customers. We don't want to go broke.





Our prices are insane! Only three bucks an hour in non-prime time. That's the lowest of all major online services. And the $8.95 monthly subscription fee includes up to four hours of non-prime time usage. Just don't blow it all the first night.

Even cooler offer!



Tired? Lazy? Technologically inept? Have we got a deal for you. Call now and get a free GEnie front-end program with icons that are incredibly easy to use. Even if you have no clue what an icon is. There's one for Windows and one for Mac.** To get yours, either download once you're on-line, or call 1-800-638-9636 for a free disk.

Get your motor running, head out on the information highway. With access to the Internet, you might discuss anything from the global socioeconomic ramifications of protectionist trade policies with top economists, to the impact of Baywatch with top...uh, Baywatchers.

GEnie®

the most FUN you can have with your COMPUTER ON!

Sign up now!

1. Set your communications software for half duplex (local echo), at 300, 1200 or 2400 baud.
2. Dial toll free: 1-800-638-8369 or in Canada 1-800-387-8330. Immediately upon connection, enter HHH (Please note: Every time you sign onto GEnie, you need to enter HHH upon connection.)
3. At the U#= prompt, enter JOINGENIE then press <RETURN>
4. At the key code prompt enter AIB222 to get this cool offer.
5. Have a major credit card ready. In the U.S., you may also use your checking account number. In Canada, Visa and MasterCard only.

We've got the biggest big-name guests on-line. Actors, authors, politicians, computer gurus. Sorry, we can't name names. We'd have to deal with Legal. We hate that.

*Some restrictions apply. Find out what they are before you sign up by calling or logging on to GEnie. Non-prime time is 6 p.m. to 8 a.m. local time Mon.-Fri., all day Sat. and Sun. and selected holidays. This offer is in lieu of all other offers, and is for new subscribers only. You don't have another service? Call us anyway.

** Minimum requirements: 386 and Windows 3.1, 4MB RAM. Mac Plus/Classic or higher, 4 MB RAM.

CIRCLE 102 ON READER SERVICE CARD

highway," part of the National Information Infrastructure designed to bring vast amounts of data into your home and business. Until then—when text, sound, and video will be available through your television, computer, telephone, or some combination—on-line services offer the closest view of the future.

Certainly, all of today's on-line systems are more static and less graphical than the dreams of future electronic communications. Certainly, the information could be easier to find and navigate, and the systems could connect more easily. But individualized data on demand from a wide range of sources is available today. It's on local BBSs, on these commercial on-line services, and on the Internet. If you want a taste of tomorrow's information highway, warm up your modem, pick an on-line service, and hop aboard.

SUITABILITY TO TASK

America Online

	POOR	FAIR	GOOD	EXCELLENT
E-mail and communications	●	●	●	○
File downloads	●	●	○	○
Information databases	●	●	○	○
News and finance	●	●	○	○
Hobbies and entertainment	●	●	○	○

America Online Inc.

America Online

BY ANDREW KANTOR

Despite its well-designed graphical interface—the best in the group—America Online (AOL) simply does not match the depth of services offered by Prodigy, its principal competitor. Moreover, AOL has nothing approaching the professional or business services of CompuServe, Dow Jones, or GEnie.

AOL seems positioned to attract the personal-use crowd. Its fine GUI and flexible account structure make it a good entry-level service, especially for households with multiple on-line venturers: Up to six users can share an account, each with his or her own user name. Bills go to the master account.

America Online's 500,000 users pay a monthly fee of $9.95, which includes 5 hours of on-line time. Each hour beyond that is $3.50, and certain services, such as fax transmissions and on-line classes, cost extra.

AOL is easy to use and contains a fair amount of information, but not as much as you might expect. For example, AOL has courted—and won—many popular magazines and newspapers, including *Omni, Time,* and *USA Today.* AOL says it carries full text and runs forums in which readers can discuss issues with the editors. But some publications don't update their on-line areas, some editors don't appear on-line very often, and some "full text" is not really full. *Wired,* for example, is usually several weeks out of date. And *The Atlantic Monthly* is gutted of the long, in-depth features it is known for.

AOL has an intuitive mail system, although you can't designate priority messages nor request a receipt. You can, however, check to see if a message to another AOL subscriber has been read. Your received messages remain on-line for seven days; you cannot download them. There is, however, one plus over the other services: You can send a message to an Internet address as easily as to a local one, and both can be included in the on-line address book or in mailing lists.

AOL's business and finance services are also easy to use but limited. They consist mainly of business news pulled from wire services as well as a limited selection of company profiles, a stock market tracker, and information on stock and commodity exchanges—fine, but only for the casual user.

The service has an average selection of titles (although far smaller than CompuServe's), but searching for software on AOL is easier than on any other service. This ease of use is partly because AOL has a single main library to look through. You search for a title using radio buttons, check boxes, and keywords, and you are quickly given a list of matches.

AOL's excellent interface covers a service that lacks much of the depth of the other services.

FACT FILE

America Online

America Online Inc., 8619 Westwood Center Dr., Vienna, VA 22182-2285; 703-448-8700

Requires: 286-based PC or better, 2MB RAM, 1.5MB hard disk space, modem, America Online DOS or Windows software. Mouse recommended.

Telephone sign-up: 800-827-6364.

In short: As a personal on-line service, America Online's interface is much more straightforward and easy to use than Prodigy's. Its offerings, however, are significantly slimmer—fewer forums, fewer people, and less information. Many of those forums, especially on-line magazines, promise more than they deliver, making AOL's bark a lot worse than its bite.

448 ON READER SERVICE CARD

America Online has more than 280 bulletin board areas, called clubs or forums. Each contains one or more message boards that are divided into topics that users create. The Aviation Club, for example, has boards for military aviation and paragliding. Depending on the volume of messages, some use a chain system, while more active areas use a limited-thread system, which supports one level of replies in addition to the main thread.

Besides being somewhat light on services, AOL also has some inconsistencies. For example, apparently in response to the welling interest in the Internet, AOL's on-line messages suggest that there is a direct Internet connection, but it is only an e-mail gateway—like the other services offer. (Full access is clearly in the works.) In addition, AOL advertises 9,600-bps support, but users have had trouble connecting at this speed. (The problem seems to lie somewhere between AOL and SprintNet, the telecommunications network through which users connect to AOL.)

If you're shopping for a "starter" on-line service, America Online may be worth a look. Just don't dig too deep.

Flexibility (flek·sə·'bil·ət·ē) *n.* 1, A feature previously not found in this category. *example:* For under $800, **TI microWriter™** printers with **Adobe® PostScript®** give you more networking and paper handling *flexibility* than Apple and HP, at a lot lower price.

THE UNDER $800 PRINTER, REDEFINED.

		TI microWriter PS23	Apple LaserWriter Select 310	HP 4ML
Print Speed		*5 ppm*	*5 ppm*	*4 ppm*
AppleTalk™ Connection		*Standard*	*Not Avail*	*Standard*
Paper Trays	*(Std.)*	*250 sheet*	*250 sheet*	*100 sheet*
	(opt.)	*250 sheet*	*250 sheet*	*Not Avail*
Auto Emulation Switching		*Standard*	*Not Avail*	*Standard*
List Price		*$799*	*$1079*	*$1279*

If you're looking for a PostScript printer with a street price well under $800, you'll have a hard time finding one with as many features as a TI microWriter.

Just look at the chart and compare it to our leading competitors, Apple and HP. Then, when you're ready for a full-featured printer that's truly flexible, at a price that's truly affordable, take a look at a TI microWriter. We're so confident you'll like it, we'll even give you our 30-day satisfaction guarantee*. For more information or a dealer near you, call *1-800-527-3500.*

EXTENDING YOUR REACH WITH INNOVATION™

TEXAS INSTRUMENTS

Adobe PostScript · MAC HOME JOURNAL · PC MAGAZINE EDITORS' CHOICE

Specifications in chart are based on information as of 11/93. *Offer applies if returned in good cond. for refund within 30 days of purchase. microWriter and "Extending Your Reach With Innovation" are trademarks of Texas Instruments. Adobe, PostScript and the PostScript logo are registered trademarks of Adobe Systems Inc. AppleTalk is a registered trademark of Apple Computer, Inc. ©1993 TI

CIRCLE 304 ON READER SERVICE CARD

CompuServe Inc.

CompuServe Information Service

BY ANDREW KANTOR

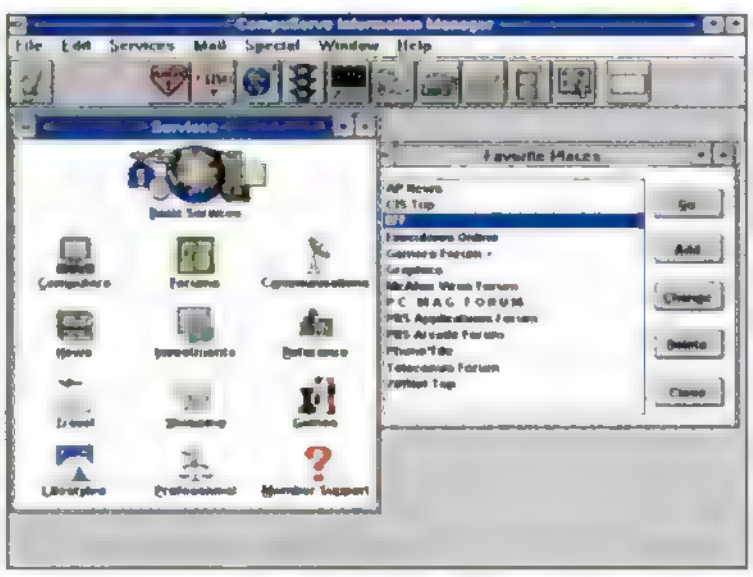
Unless you count the Internet, no on-line service offers as much as CompuServe does, period. Prodigy can claim more users (2 million compared with CompuServe's 1.6 million), but none hold a candle to the breadth and depth of forums, databases, files, and services on the CompuServe Information Service (CIS).

With all that said, and noting its excellent e-mail facilities, what's not to like? One of the few things might be the price. For $8.95 per month, you are given unlimited access to almost everything—news, stock quotes, general reference, travel services, shopping, and games—except the forums. But the forums are the heart of CompuServe, and you'll spend $8.00 an hour for 1,200- or 2,400-bps access, and $16.00 per hour for 9,600- or 14,400-bps access for them.

In spite of that, CompuServe remains the solid choice for either the professional or personal user. Moreover, in the first quarter of 1994, CIS plans an across-the-board 40 percent cut in its hourly rates. (For infrequent users, CompuServe already offers an alternate pricing plan, in which all services are charged at the hourly rates, and you only pay a $2.50 per month maintenance charge.)

You can access this mother of all on-line services in several ways. Like GEnie, you can dial in with any communications package and use the service's menus. Several companies, including CompuServe itself, have also designed *front-end* packages specifically for easy navigation (see "On the Front Lines"). And two of the most popular, CompuServe Information Manager (CIM) for DOS and CIM for Windows, are provided by CompuServe essentially free (they cost $10 but come with a $10 usage credit).

CompuServe Mail handles local, Internet, fax, telex, and postal addresses through a single interface, so you can create a mailing list with a mix of delivery methods. It's second only to MCI Mail in the scope of features; you can send files (although not attached to messages), you can get receipts, and most front ends allow you to move messages to your hard disk.



CompuServe offers more services in more areas than any other on-line provider.

CompuServe's sheer size can be overwhelming: Posting a message in the Desktop Publishing Forum asking for assistance may generate hundreds of responses. But its size is also its strength. CompuServe offers more than 600 forums. More than 200 of those are computer-related, and more than 400 computer-industry vendors participate there. There are other forums for auto mechanics, physicists, writers, and almost any other occupation and interest.

CompuServe also offers a gateway to ZiffNet, Ziff-Davis's independent, computer-oriented service. For $2.50 per month (plus hourly charges equaling CompuServe's), members have access to forums representing all of Ziff's magazines: *PC Magazine, Computer Shopper, MacUser, MacWeek, PC/Computing,* and *PC Week.* Users can download shareware, get answers to computing questions, and interact with publication editors who frequent the forums.

SUITABILITY TO TASK

CompuServe Information Service

	POOR	FAIR	GOOD	EXCELLENT
E-mail communications	●	●	●	○
File downloads	●	●	●	●
Information databases	●	●	●	●
News and finance	●	●	●	○
Hobbies and entertainment	●	●	●	○

FACT FILE

CompuServe Information Service

CompuServe Inc., P.O. Box 20212, Columbus, OH 43220; 614-457-0802

Requires: 8088-based PC or better, any communications software (including Microsoft Windows' Terminal application), modem. Front-end software recommended.
Telephone sign-up: 800-848-8199.
In short: The most comprehensive of all the on-line services, CompuServe offers a wide range of features and by far the largest number of forums and discussion areas. Its news and information services are also top-notch, and a large selection of front ends make navigation and use easy. Barring the Internet, no service comes close to matching its breadth and depth. A new pricing scheme, scheduled for this spring, sweetens the deal.

449 ON READER SERVICE CARD

As with everything else about it, CompuServe's information resources are done in a big way. The full text of newspapers (more than 60) and magazines (more than 200), close to 4,000 software libraries, news feeds from AP and Reuters, and three travel services deliver incredible power and information. Only Dow Jones provides more business-related information. CIS has nearly 1,500 databases, including some—such as Phone*File, a national telephone directory—not found anywhere else. As with GEnie, for an extra price you can access other powerful databases, such as Dialog and Knowledge Index.

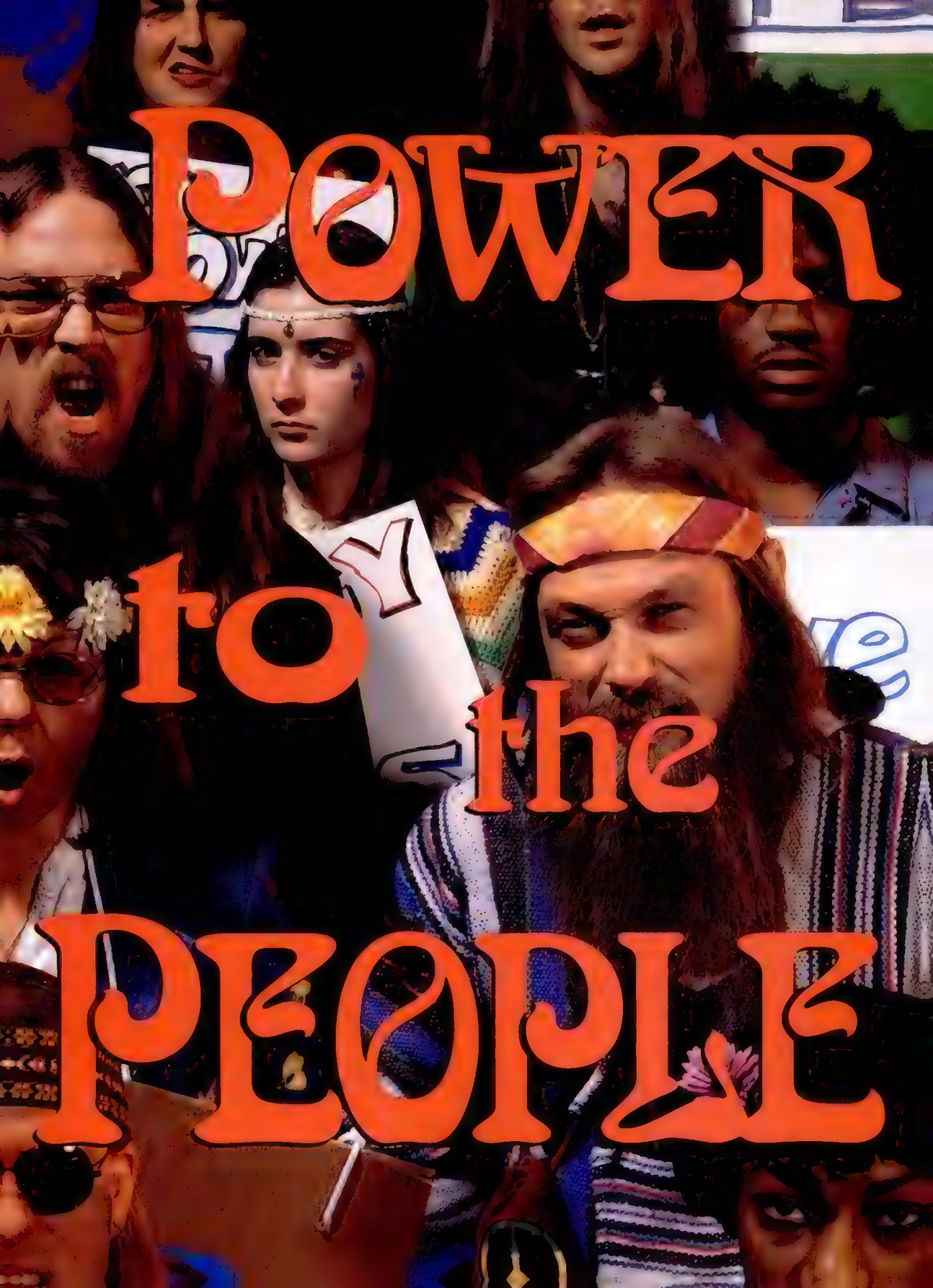
Despite its price (which should be much more palatable by the time you read this), if you need professional information on-line, CompuServe is the place to look.

Dow Jones & Co.
MCI Global Messaging Service

Dow Jones News/Retrieval with MCI Mail

BY JOEL DREYFUSS

Dow Jones News/Retrieval service (DJN/R) delivers a rich lode of on-line business news, financial data, and general information. And combined with MCI Mail, the country's largest e-mail service (with which it shares a two-way gateway), it provides an unrivaled electronic busi-


POWER
to the
PEOPLE

Now more than ever, we're giving power to the people. Our Pentium-based PCs systems are priced hundreds, sometimes thousands of dollars less than competitors' comparably configured Pentium systems. That's PC power everyone can afford!

intel inside

Best Overall Systems Supplier

#1 in Overall Reliability & Likelihood of Buying Again, 1993 & 1994

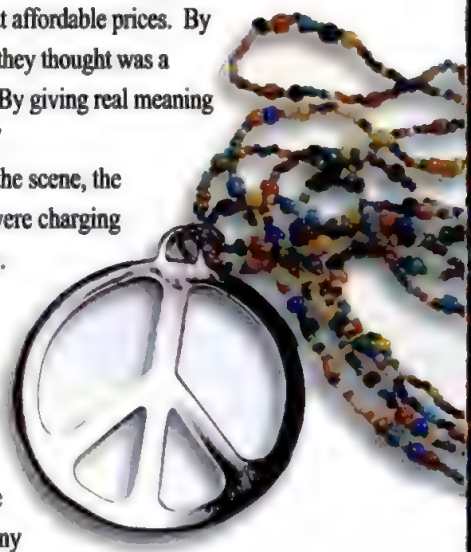
Best Service Best Mail Order Co

Best Service

You Got It, Baby!

By the Time We Get to Woodstock

When historians write the history of the personal computer industry years from now, they'll remember Gateway 2000™ as the radical PC manufacturer that gave power to the people by selling the highest-quality, latest-technology computers at affordable prices. By showing PC buyers a level of service they thought was a throwback to the peace and love era. By giving real meaning to the tattered, worn-out term "value."



When Gateway 2000 came onto the scene, the establishment computer companies were charging whatever they wanted for technology. Gateway was a real downer to them because we began selling the same technology for a whole lot less. And the buyers were very smart. They shouted, "Hell no, we won't go," to the big companies, and took a chance on the revolutionary Midwest company called Gateway 2000. Soon a great legion of people — even more than Woodstock attracted — was buying Gateway PCs.

Today, Gateway 2000 is bigger than many of the companies for which it was an alternative. So why should you buy a Gateway computer today? Same reasons as in the beginning. You still get the best price, quality and service from us.

Demonstrations

That's why *PC Magazine* readers said Gateway 2000 was #1 in overall reliability, and we also received the most votes when readers were asked if they would buy again from the same company — in both desktop and portable PC categories. (Thanks, *PC Mag* readers!) That's why, for the third consecutive year, we swept *Computer Shopper's* Best Buy Awards. (Thanks, *Shopper* readers!) And that's why we took five top honors in *PC World's* World Class Awards, including Best Mail Order Company and Best Service and Support. (Thanks, *PC World* readers!) Even though we're now a Fortune 500 company, we still champion anti-establishment thinking. Check it out. You'll find GW2K is far-out, groovy and totally unreal!

GATEWAY2000

"You've got a friend in the business."®

8 0 0 - 8 4 6 - 2 0 6 3

Gateway Gives You Performance

The Eagle has Landed

When Gateway 2000™ introduced a Pentium™-based system — loaded — for under $4,000, everybody in the industry knew the Eagle had landed. The best PC value on the planet had arrived! The editors of *PC/Computing* heralded the accomplishment by naming it Best Desktop of 1993.

Then we topped our achievement by offering *four* Pentium processor-based systems, including a *new 66MHz model*, priced from $2,495 to $3,995. Now that's a giant leap in value for one of the highest-performance PCs on earth. These systems are tomorrow's technology available today at affordable prices — only from Gateway.

Our P5 systems include Intel's 64-bit Pentium processor, which moves instructions and data twice as fast as a 486 system. The P5 PCs get another performance boost from a PCI local bus. The PCI bus can operate 10% to 15% faster than a VESA® local bus. New this month, all PCI local bus systems also include a PCI IDE interface, which dramatically improves hard drive performance (up to twice as fast). The PCI bus' "plug and play" feature makes your PC easier to use, too, by automatically configuring peripherals.

Space-Age Video

The PCI bus is coupled with a space-age video system, with 2MB standard video memory giving you 64,000 colors at 1024 x 768 resolutions. The high-performance PCI-based video system achieves 16 million colors, true 24-bit, in VGA and SVGA resolutions. Our standard video system gives you the best overall performance on the market.

The net effect of the PCI local bus and this video system is computer performance that will send you into orbit. It's definitely far-out!

486 PCI Local Bus System is A-OK

The PCI local bus with PCI video and disk subsystems is also available in a 66MHz 486DX2 system, which is upgradable to the Pentium OverDrive™ processor. Another A-OK value in a high-performance system from Gateway!

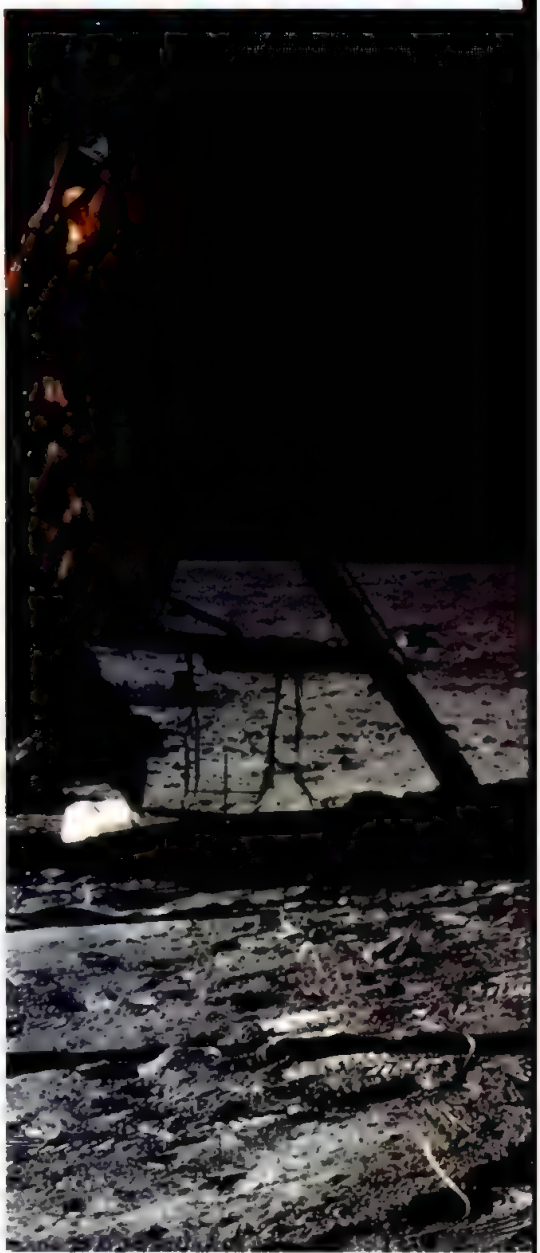


Photo courtesy of NASA. Thanks!

GATEWAY2000

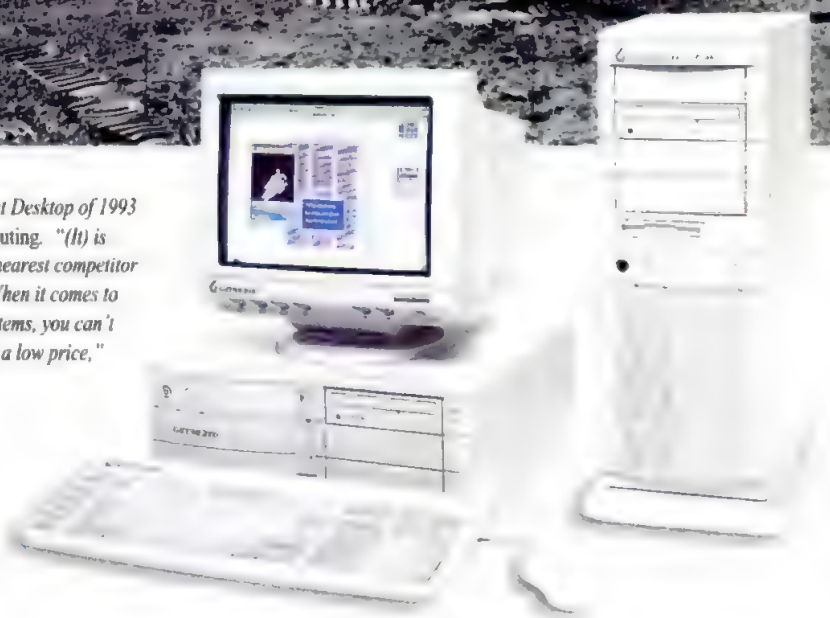
"You've got a friend in the business."®

8 0 0 - 8 4 6 - 2 0 6 3

That's Out Of This World!

Our P5-60 was named Best Desktop of 1993 by the editors of PC/Computing. *"(It) is nearly twice as fast as its nearest competitor at Windows operations. When it comes to top-of-the-line desktop systems, you can't beat high performance for a low price," states the editorial.*

Best Desktop of 1993



Our new 66MHz Pentium-based system is priced at only $3,995.

intel inside

Be A Trend-Setter With A

Our 4DX2-66V model has to be one of the most highly decorated PCs in the history of the industry. For good reason! Like other Gateway VESA and integrated systems, it's a very attractive value.

intel inside

4DX2-66V
Best Desktop

4DX2-66V
Best Windows PC

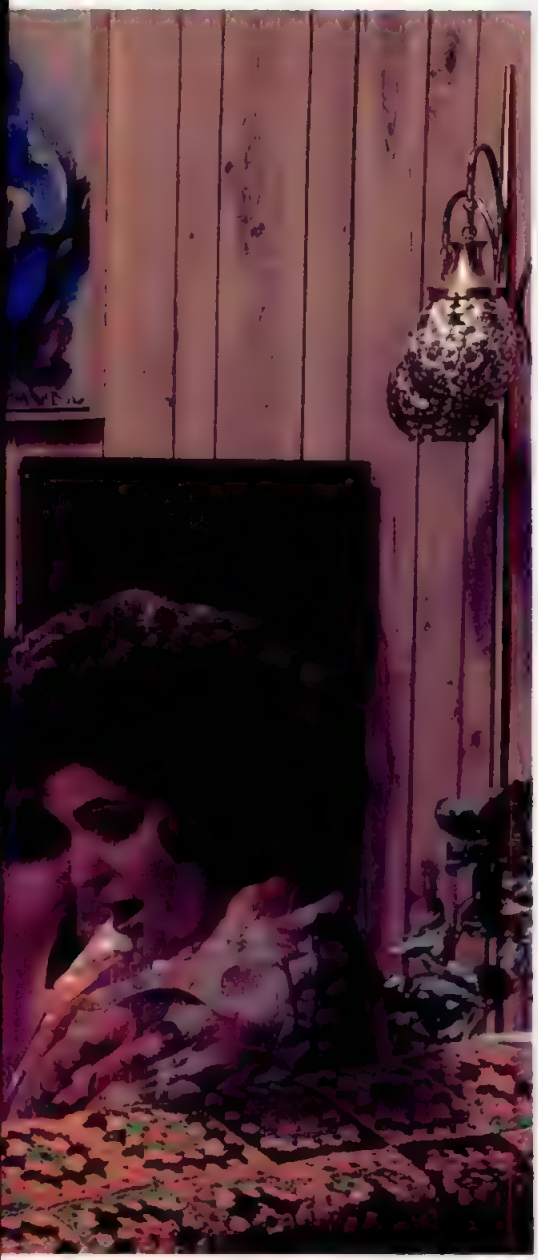
4DX2-66V

4DX2-66V

4DX2-66V

4DX2-66V

Gateway VESA Or Integrated PC



Our Family PC™ comes with CD-ROM, sound card, speakers, joystick, fax/modem and multimedia software. You choose one software option from five great Family PC multi-title packages. Some of the outstanding titles you can get are: Microsoft Works,™ Dinosaurs and Encarta,™ Cinemania,™ Time Almanac, Links Golf Collection, The Animals!, MicroProse™ Game Pack, MECC Elementary Education Pack — and more!

You'll be a trend-setter in your office or neighborhood if you choose a Gateway VESA® or integrated system because there's nothing more fashionable than a great buy. Everybody wants one!

VESA a Go-Go

Our VESA local bus machines give you go-go performance at a fab price. VESA, which stands for Video Electronics Standards Association, assures you of compatibility with any VESA peripheral. These systems are also upgradable to a Pentium™ OverDrive™ processor if you need more processor power in the future.

Integrated PCs Sock it to 'Em

Our integrated systems definitely sock it to the competition. Offered in space-saving mini desktop cases, our local-bus integrated PCs give you twice the video performance available in many standard desktop machines. In fact, video performance in our integrated systems is similar to, or better than, that found in many of our competitors' high-end systems.

Of course these machines are also upgradable to a Pentium OverDrive processor.

Our special Family PC,™ with full multimedia capabilities and exciting software choices, is priced at only $1,995. Ask us for details.

If you want a mod PC for the fewest dollars possible, you want an integrated system from Gateway. You can bet your bippy on that!

Energy Stardom

All Gateway 2000™ VESA local bus and integrated systems wear the Energy Star seal to show they comply with energy-saving guidelines established by the EPA. Our commitment to the Energy Star program is just one of the ways we're working to help the environment — and to help you save money!

GATEWAY2000

"You've got a friend in the business."®

8 0 0 - 8 4 6 - 2 0 6 3

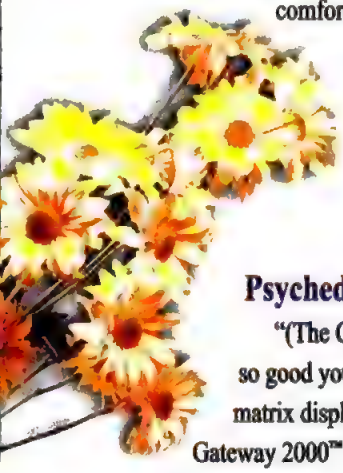
For The Rolling Stone In You.

Whether you travel constantly from continent to continent or occasionally from office to home, Gateway has the perfect portable PC to keep you rollin' on down the highway.

Easy Rider

The revolutionary HandBook® 486 gives you more MIPS per pound than any other PC! Plus, the HandBook is the answer to the most common question seasoned portable users ask themselves: Should I take my portable or not? Is it worth the hassel? With a HandBook, you'll never ask yourself that question again. It's so small and light, it's effortless to carry. The decision is automatic: Of course you'll take your HandBook. You'll never want to be without it! The HandBook is a truly extraordinary product that will forever change the way you use a PC.

The HandBook has all the features that matter to you, too, including: ideal weight and size (less than 3 pounds, about the size of a day-planner); plenty of power (genuine Intel® SL Enhanced 486 processor); great screen (bright, 7.9-inch backlit VGA display); comfortable 78-key keyboard; EZ Point™ integrated pointer (no need to carry a clumsy mouse); excellent battery life; suspend/resume (a handy feature that allows you to stop work any time and resume later without losing data or restarting the system).



Psychedelic Day-Tripper

"(The ColorBook's) 9.4-inch dual-scan color display is so good you might think you accidentally got an active matrix display." That's what *PC Magazine* said about the Gateway 2000™ ColorBook. It's psychedelic! The ColorBook, with its latest-technology color display, also includes: 486 performance (genuine Intel SL Enhanced 486 processor); excellent portability (weighs less than 5.7 pounds and is ultra-thin — just 1.77 inches); simultaneous video support; a built-in trackball; two PCMCIA Type II slots (can also be used for one Type III PCMCIA card); great battery life (up to four hours); suspend/resume.

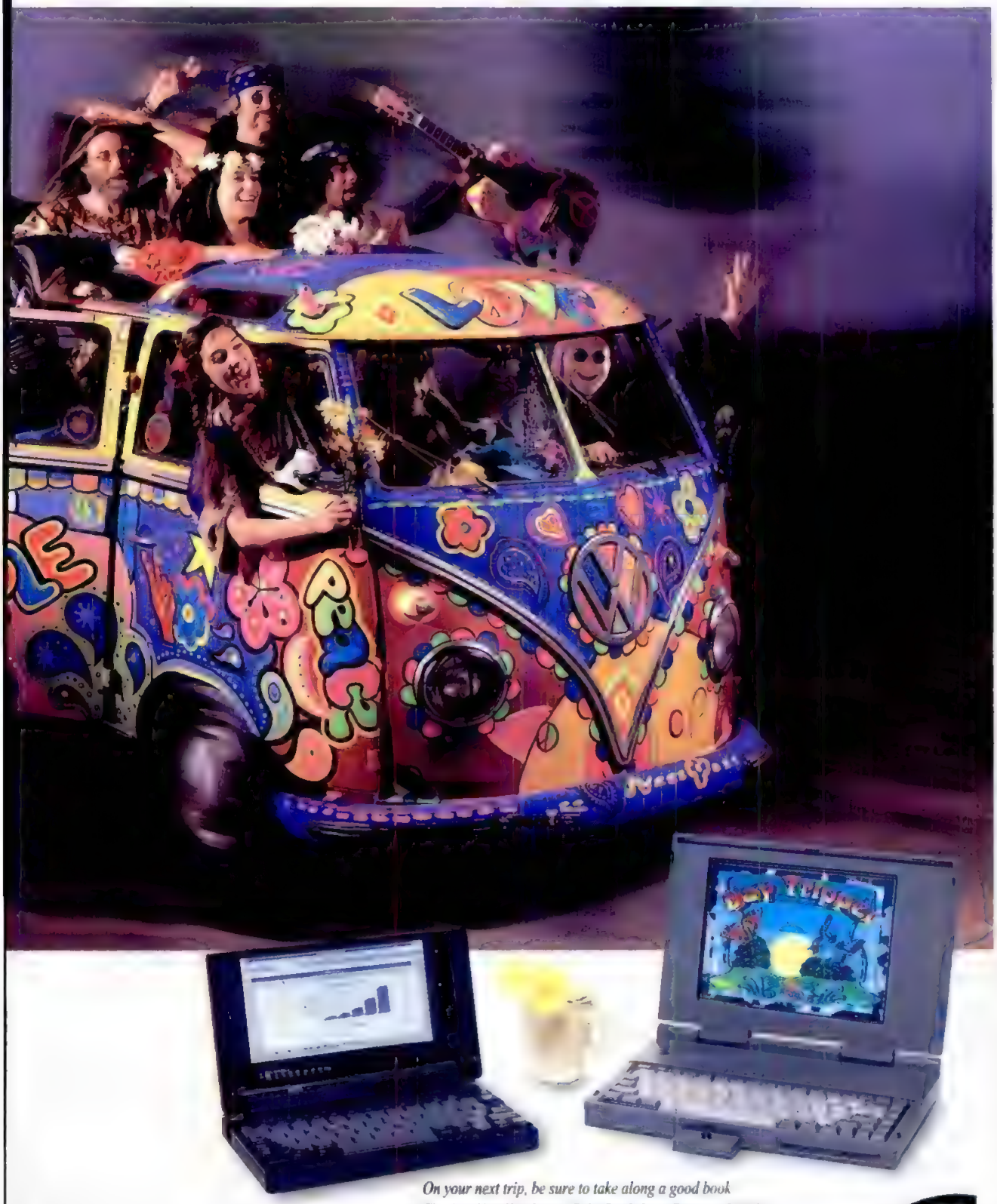
For dazzling color at a mono price, look no further than the ColorBook.

GATEWAY2000

"You've got a friend in the business."®

800-846-2063

Gateway Has Groovy Portables.



On your next trip, be sure to take along a good book
That's a HandBook or a ColorBook from Gateway 2000!

HandBook
Best Subnotebook

HandBook
Best Subnotebook

HandBook
Best Hand Held/Palmtop

intel inside

Add A Twist

Shown here is our P5-60 model loaded with options including a 17-inch CrystalScan monitor, combo floppy drive, multimedia kit with optional Yamaha speakers, Colorado Memory Systems tape backup unit, FlightStick and Epson Stylus 800 printer. With multimedia, the sights and sounds of any era are available to you with a click of your mouse. Right on!

intel inside

SUMMARY OF FEATURES CONTINUES

On-Line Services

PC MAGAZINE

Services listed in alphabetical order ■ = YES □ = NO	America Online	CompuServe Information Service	Dow Jones News/Retrieval with MCI Mail	GEnie	Prodigy Interactive Personal Service
General					
Maximum access speed (bps)	9,600	14,400	9,600	9,600	9,600
Number of paid subscribers	500,000 households	1,600,000 members	Info not available	400,000 members	1,000,000 households
Maximum number of users per subscription	5	1	1	1	6
Number of countries served	2	135	85	29	1
Toll-free access	□	■ (with $9/hour surcharge)	■	■ (surcharge: with up to 2,400 bps, $6/hour)	□
On-line and telephone support	■	■	■	■	■
Requires interface	■	□	□	□	■
Number of PC interfaces available	2	20	2 (Dow Jones), 6 (MCI)	2	2
Environments	DOS, Macintosh, Microsoft Windows	Amiga, DOS, HP95LX, Macintosh, Microsoft Windows, OS/2	DOS, Microsoft Windows	Amiga, Atari, DOS	DOS, Macintosh, Microsoft Windows
Fees					
Initial sign-up fee	None	None	None	None	$29.95
Monthly fee	$9.95	$8.95	$75.00 (Dow Jones)	$8.95	$14.95
Includes	5 hours of connect time, unlimited e-mail messages	Unlimited access to basic services; about 80 3-page e-mail, Internet, MCI Mail, or Telex/TWX messages	10 hours of connect time	4 hours of connect time to basic services	Unlimited access to core features; 2 hours of Plus features, 30 e-mail messages
Timed fees:					
Prime time: 2,400, 9,600, 14,400 bps	$3.50, $3.50, N/A (all services)	$8.00, $16.00, $16.00, (Extended services)	$0.56 to $1.30 per minute; additional fees and download charges per unit of information	$12.50, $18.50, N/A (all services)	$3.60, $3.60, N/A (Plus features)
Other times: 2,400, 9,600, 14,400 bps	$3.50, $3.50, N/A (all services)	$8.00, $16.00, $16.00 (Extended services)	$0.15 per minute; additional fees and download charges per unit of information	$3.00, $9.00, N/A (all services)	$3.60, $3.60, N/A (Plus features)
E-mail					
Charges for additional e-mail messages not included with monthly fee	None	First 7,500 characters sent or received, $0.15; each additional 2,500 characters sent or received, $0.05	First 1,000 characters, $0.50; next 500 characters, $0.10; each additional 1,000 up to 10,000, $0.10; each additional 1,000 thereafter, $0.05	None	Messages composed on-line, $0.25 each; messages composed off-line using Mail Manager, $0.10 each
Number of attachments/Maximum size	1, none	1, 2MB	Unlimited, none	1, none	1, 1MB
Real-time conversations (chat)	■	■	□	■	□
Computers/Software					
Number of technical support forums	167 (167 vendors)	200 (450 vendors)	None	80 (80 vendors)	1 (6 vendors)
Vendor software libraries/Real-time conferences	■■	■■	□□	■■	■□
On-line shareware registration	□	■	□	□	□
Software downloads	■	■	□	■	■ (through ZiffNet)
Scans files for viruses	■	■	N/A	■	■
File locator	■	■	N/A	■	■
Databases and Research					
Government information:					
Number of resources	3	5	53	5	9
Examples	Library of Congress, Smithsonian and White House forums	Census, patent, and trademark data travel advisories	FDIC, Federal Industry Watchdog	Census, copyright, and patent data; Federal Register	Political Profiles, White House Connection
On-line encyclopedia	Compton's Encyclopedia	Grolier's Academic American Encyclopedia	Grolier's Academic American Encyclopedia	Grolier's Academic American Encyclopedia	Grolier's Academic American Encyclopedia
Number of magazine resources:					
Searchable full-text magazine databases	None	8	7	1	None
Forums or other interactive services	31	17	None	None	5
Full text and back issues available	31	2	N/A	N/A	5 (selected articles)

N/A—Not applicable: The service does not have this feature.

SUMMARY OF FEATURES — ENDS

PC MAGAZINE EDITORS' CHOICE

Services listed in alphabetical order ■ = YES ☐ = NO	America Online	CompuServe Information Service	Dow Jones News/Retrieval with MCI Mail	GEnie	Prodigy Interactive Personal Service
Databases and Research (continued)					
Number of newspaper resources:					
Searchable full-text newspaper databases	None	5	4	1	None
Forums or other interactive service	2	3	None	None	None
Full text and back issues available	2	3	N/A	N/A	N/A
Health-information databases	3	7	19	5	1
News and Financial					
News sources	17	4 national, 3 international	13	1	1 (includes news from 3 sources)
Personal clipping service	☐	■	■	■	■
Local and international weather forecasts	■	■	■	■	■
Consumer information:					
Consumer Reports/Other	■	■	■	■	■
Financial services:					
Stock quotes and mutual fund rates	■	■	■	■	■
Brokerage services	☐	■	■	■	■
Company information	■	■	■	■	■
Dun & Bradstreet's company profiles	■	■	■	■	■
Standard & Poor's company profiles	☐	■	■	■	☐
Portfolio manager	■	■	■	☐	■
Stock quotes	■	■	■	■	■
No additional charge	■	■	☐	☐	■
New York and American Stock Exchanges	■	■	■	■	■
Treasury fund rates	☐	■	■	■	■
Hobbies and Entertainment					
Number of discussion areas and resources	37	14	2	30	6
Examples	Hollywood Online, Warner Records Online, movie reviews	Hollywood Hotline, Roger Ebert's Movie Reviews	Book reviews, movie reviews	Cineman movie reviews, Hollywood Hotline, MovieBase	Movie Guide, Zagat Restaurant Guide, on-line movie polls
Travel:					
EAAsy Sabre	■	■	☐	■	■
Official Airline Guide (OAG)	■	■	■	■	☐
Single- and multiplayer on-line games	■	■	☐	■	■
Topical discussion areas					
Approximate number of areas	280	600	None	250	40
Health:					
Number of areas	5	8	N/A	4	2
Examples	Better Health and Medical Forum	HealthNet	N/A	Family RT, Medical RT	Relationships, vitamins
Hobby:					
Number of areas	20	50	N/A	6	5
Examples	BikeNet, Ham Radio Club	Cooks Online, Scuba Forum	N/A	Quilting RT, Science-fiction RT	Aviation
Social or political:					
Number of areas	16	4	N/A	5	1
Examples	Ethics and Religion Club, The Exchange	Issues Forum, Religion Forum	N/A	White House RT, Public Forum RT	Congress, courts
Professional:					
Number of areas	13	20	N/A	10	5
Examples	Business and Finance, Writers' Club	Journalism Forum, Legal Forum	N/A	Home Office/ Small Business RT	Entrepreneurs, finance
Education:					
Number of areas	16	7	N/A	4	3
Examples	CNN Newsroom, College Board Online	Education Forum, Students' Forum	N/A	Education RT	College issues

N/A—Not applicable: The service does not have this feature

CompuServe would like to introduce you to our information highway. Complete with visitor centers, shopping malls, town squares, and other world travelers.

You've probably been hearing a lot about the information highway lately. But before you take your next trip, maybe you should make sure the highway you're on is a superhighway. Like CompuServe.

CompuServe has nearly 2,000 places for you to go, things for you to see, and fun for you to have. You can turn in to one of our many forums where nearly every hardware and software vendor is represented, along with almost every shade of political opinion. Our Electronic Mall® is filled with the newest merchandise, and our CB Simulator and Electronic Convention Center let you just stop by and chat.

Other services range from renowned reference databases to timely financial data and thousands of freeware and shareware programs.

Plus, CompuServe has over a million and a half members worldwide. So, you're bound to find plenty who will share your interests, be able to offer advice, or just become fast friends.

For only $8.95 a month, you can get unlimited connect time — day or night — to a full package of more than 50 basic services. That includes news, stock quotes, travel arrangements, movie and restaurant reviews, 60 E-mail messages a month, and more. Plus, a whole universe of other services is available at nominal additional charges.

So, get on the fast track. For more information or to order, see your computer dealer or call 1 800 848-8199. And take our information highway straight into the next century.

CompuServe®

The information service you won't outgrow.™

CIRCLE 274 ON READER SERVICE CARD

A Compute To Use Dese This Easy

1) The Deskpro XE has preinstalled software to get you up and running quickly. 2) It's plug and helps you better organize your work. 4) Enhanced Business Audio lets you operate the PC with your

©1993 Compaq Computer Corporation. All Rights Reserved. Compaq and Deskpro Registered U.S. Patent and Trademark Office. Business Audio is a trademark of the Compaq Computer Corporation. Product names mentioned

R THIS EASY RVES AN AD TO READ.

play capable so future upgrades are a snap. 3) An exclusive new software interface called TabWorks voice. 5) And starting at $1,499*, it's easy on your budget. 6) For details, just call 1-800-345-1518.

COMPAQ

herein may be trademarks and/or registered trademarks of their respective companies. *Estimated selling price, actual price may vary. The Intel Inside logo is a trademark of the Intel Corporation.

CIRCLE 137 ON READER SERVICE CARD

The Next Generation

by Rick Ayre

A new generation of on-line services is about to debut—a generation that will pack more, newer, and better technology than any that has preceded it.

Apple Computer's e•World, AT&T's PersonalLink, and a service from Ziff-Davis Information Service (ZDI) code-named Interchange are three on-line services scheduled to debut in 1994. The announcements came like a chain reaction: The three companies announced their services within weeks of each other early this year. All three are slated to begin extended beta testing, allowing limited public access soon, and each is expected to take a different road toward providing on-line information.

AT&T's PersonalLink is designed as a different approach to electronic mail, essentially a consumer-oriented counterpart to AT&T's business-oriented EasyLink mail service. PersonalLink will deal with personal *agents*. These agents will function as automated scripts that perform tasks for you.

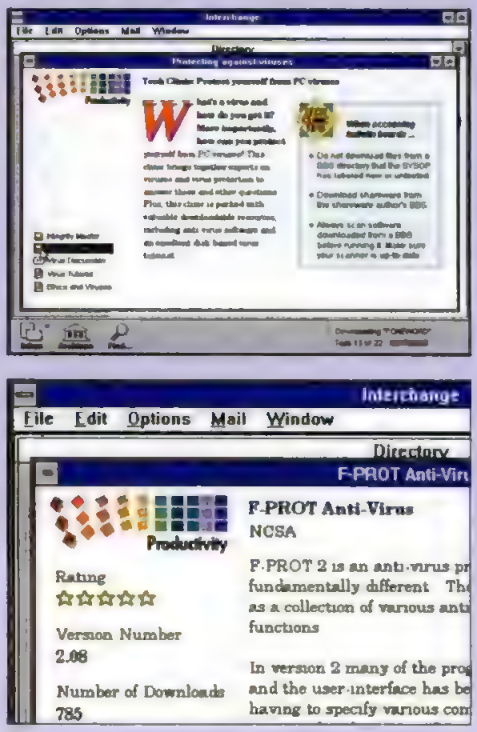
PersonalLink users will write their own scripts, in the English language–like Telescript communications language from General Magic, an Apple spin-off. Telescript's "intelligent agent technology" will let users create and control their own personal agents. For example, users could have agents alert them to news that they are waiting for, or for a message from a particular person. Personal agents could be instructed to forward mail on a specific topic or from a particular person to assistants or to other people.

Apple, which long has supported its AppleLink service as a source of developer support, hopes e•World will be its entry into the consumer on-line arena. The e•World interface uses a geographic metaphor to represent the on-line community. Each building will represent a specific area of the on-line service.

There will be a Library for research, a Newsstand for news and sports publications, a Business and Professional Plaza for business information and professional services, an Arts and Leisure Pavilion for entertainment and hobbies, a Computer Center for computer aid and software, and a Marketplace for purchasing products and services. As part of e•World, Apple will also offer the usual set of electronic mail services, including gateways to the Internet and the commercial on-line systems.

Apple sees its role as both a provider and a facilitator: It provides the neighborhood in which data publishers build. Each publisher will provide information, following Apple's "zoning regulations," and each will customize its own building in ways appropriate for the content. Users will then use e•World's familiar geographic metaphor to navigate among the various buildings.

Apple has already signed up Dow Jones & Co. to participate, and there's some speculation that there ultimately will be links or gateways between the Apple and AT&T services. Apple plans initially to offer software to connect to e•World from the Macintosh. Later, Newton and Microsoft Windows interfaces will be available. The Apple service architecture is designed to facilitate global distribution. It supports multiple languages for both content and applica-



The interface for ZDI's service (code-named Interchange) includes hot spots for navigating from, say, the top to the bottom screens on Anti-Virus. It's more like using hypertext—or hypermedia.

ness tool—but at a price that might scare away some users.

DJN/R costs $75.00 per month for a corporate account, which includes 10 hours of free connect time. Afterwards, you'll spend up to $1.30 per minute—$78.00 an hour—just to search most of the databases, and an additional $0.76 for each 1,000 characters you retrieve. The total is roughly ten times as much as what you would pay for CompuServe or GEnie. In addition, MCI Mail charges $0.50 for the first 500 characters of a message. But for what you spend on DJN\R, the information is high quality. And Dow Jones plans a major price change for later this year.

DJN/R is built on the core data that Dow Jones & Co. generates every day: the contents of *The Wall Street Journal* and of the Dow Jones News Service, a financial wire service, much of which cannot be found anywhere else. These two sources provide an incredible amount of financial information, including stock prices (with a 15-minute delay) and extensive corporate financial reports. You can also call up a list of stories to get a quick update on the important news of the day.

For e-mail, you'll need to arrange and pay for a separate account with MCI. Then you can send and receive messages to MCI Mail subscribers, as well as users on CompuServe, the Internet, and other providers. You can send binary files to other MCI Mail subscribers. MCI also provides postal and fax service. (Note that MCI is the best mail service here, but also the most costly.)

tions. The e•World service will be rolled out in the United States, but it will soon be expanded to include language versions in other languages—French, German, and Japanese.

Pricing for the United States version of e•World will be $8.95 for a basic monthly subscription, which will include two hours of connect time. Additional off-peak, evening hours will each cost $4.95. Pricing for service outside the United States had not been announced at the time we went to press.

ZDI has developed a different kind of architecture for on-line with its new service—code-named Interchange. ZDI, a division of Ziff-Davis (publisher of *PC Magazine*), now brings you ZiffNet on CompuServe and Prodigy. But this service is very different. It was designed to use a client/server model, so you create links to the service that are freshened and updated every time you log on.

Unique among on-line services, this feature allows users to store programs and data locally and on the service. Users can then browse data at their convenience. Using such a feature to customize your interactions to the service can save connect time and money.

The interface uses rich, compound documents that contain text, graphics, and hot spots for navigation. Navigating the service, using these documents, is more like using hypertext—or hyper*media*—than using today's on-line services. Many compound documents are already there, and you can easily fashion your own. In addition, ZDI will have on-line editors crafting custom documents that users can add to their own interfaces. The ZDI service will recruit advertisers as well, much the way Prodigy does today.

The underlying host architecture uses what ZDI calls universal linking and ubiquitous indexing. It lets you more easily browse through enormous stores of information. All the information—whether stored in databases, in public discussions, or contained in file descriptions—is cross-indexed. For example, you can search for the occurrence of such words as *Newton* or *cartography* and find every time they are mentioned in discussion threads, text databases, or news stories.

ZDI's service will focus initially on delivering Ziff's own content, such as information about computers as well as computer software to download, although ZDI will also eventually recruit other publishers to participate.

These three new products all take advantage of the computers of the 1990s—and their faster chips and better graphics—to take demanding users where no on-line service has gone before.

Another question looms: Will Microsoft begin an on-line service of its own? As we go to press, stories are beginning to circulate indicating that Microsoft is indeed planning its own on-line service. Little is known about it, but Bill Gates discussed it briefly in an interview in *The New York Times* stating that the Microsoft service also will be a commercial offering that will deliver services like e-mail and news, as well as the Microsoft support databases. The service is expected to debut late in 1994. □

SUITABILITY TO TASK

Dow Jones News/Retrieval with MCI Mail

	POOR	FAIR	GOOD	EXCELLENT
E-mail communications	●	●	●	○
File downloads	N/A			
Information databases	●	●	●	●
News and finance	●	●	●	●
Hobbies and entertainment	●	○	○	○

FACT FILE

Dow Jones News/Retrieval with MCI Mail

Dow Jones & Co., P.O. Box 300, Princeton, NJ 08543-0300; 609-452-1511; fax: 609-520-4775.

MCI Global Messaging Service, #700, 1133 19th St., NW, Washington, DC 20036; 202-833-8484, 800-444-6245

Requires: 8088-based PC or better, any communications software, modem

Telephone sign-up: 609-452-1511 for Dow Jones, 800-444-6245 for MCI Mail

In short: If business is your business, the Dow Jones News/Retrieval and MCI Mail combination will give you everything you ever wanted, but at a steep price. DJN/R provides stock, mutual fund, and futures prices and analysis, plus every other kind of business news and information you could ask for. It also has searchable text from more than 1,200 publications and news wires. MCI Mail is a top-of-the-line mail service, offering everything from soup to nuts in electronic messaging. Like DJN/R, its price is high, and its cryptic interface is best covered by one of the many front-end packages on the market

450 ON READER SERVICE CARD

Besides using the DJN/R gateway, you can access MCI Mail directly using an 800 number. A variety of third-party front ends make managing messages easier than using the standard command-line interface (see "On the Front Lines").

To make using DJN/R easier and to reduce on-line costs, Dow Jones has created two Windows-based front ends, News/Retrieval Link and TextSearch Plus. News/Retrieval Link turns cryptic commands into buttons and menus, which makes this rich on-line service more accessible to the average user.

The real gem of DJN/R is the Dow Jones Text Library, a vast searchable database that includes all of Dow Jones's publications plus 1,400 general and trade publications, major newspapers (*The Washington Post*, for example), and magazines such as *Fortune* and *U.S. News & World Report*.

TextSearch Plus allows you to search any of those thousands of newspapers, journals, and magazines for words, phrases, or topics. You can choose publications individually or by categories like aerospace or communications. It supports Boolean (AND, OR, NOT) logic, proximity criteria (within *x* words of), company names, and stock symbols. You can save your searches for future use and capture the results to a text file, as well as create clip files and save stories to folders according to keywords you define. For up-to-date business information, Dow Jones News/Retrieval has no peer—and it includes general information to boot.

DJN/R also gives you access to public

documents on companies, as well as detailed financial information through Dun & Bradstreet and Standard & Poor's and via analyst reports in the Investext service. Foreign stock exchanges and companies are covered in depth. But watch the meter—a full history, profile, and financial record of a company runs $106.

If business is your business, Dow Jones is your on-line service. For the right user, it's no doubt worth every bit of its premium price.

Dow Jones News/Retrieval's Windows interface makes a somewhat complex service easier to use.

General Electric Information Service

GEnie

BY ANDREW KANTOR

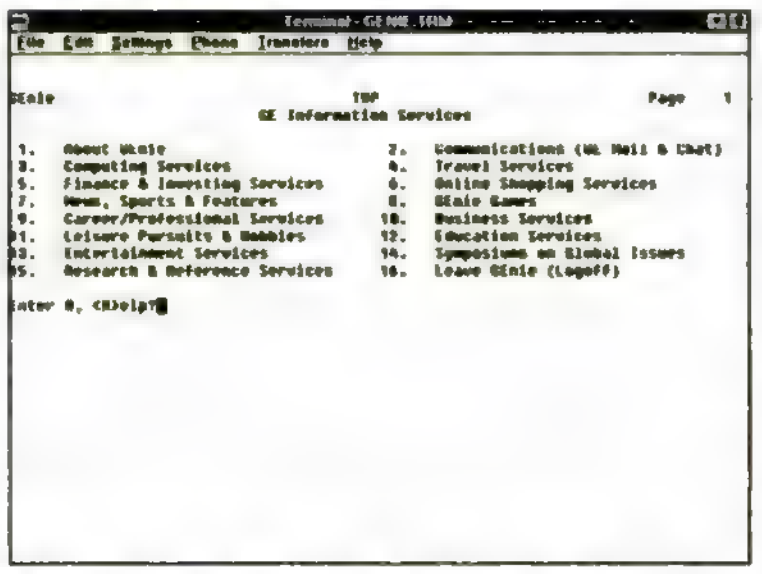
If Dow Jones News/Retrieval (DJN/R) is tailored to the news-focused businessperson, then GEnie (General Electric Network for Information Exchange) is geared toward the professional who needs occasional access to vast and varied databases of information. GEnie also carries a broad range of user forums, including 80 dedicated to computer-related discussions.

But although GEnie offers a rather inexpensive way to gain *access* to considerable databases, the cost of actually using some of them can be prohibitive—searches can run to $20 or $30 in the more expensive services. It's clear that GEnie is not for the casual user or even for a mere information browser.

Costing only $8.95 per month and as little as $3.00 an hour after the first four hours, GEnie calls for a much more economical initial investment than does DJN/R. And unlike the more personal services, America Online and Prodigy, GEnie can be accessed from any communications package, including something as simple as Windows' Terminal application. Its strength, though, lies in the professional-level, third-party databases it provides access to. GEnie gets you to Charles Schwab Investing; the gigantic Dialog—with more than 400 databases, including Businesswire, Peterson's College Database, and TRW corporate credit profiles; and to a gateway to DJN/R—the only service to do so.

Once connected, users make selections from a series of numbered menus, or by typing in a keyword. A new interface, called GEnie for Windows, will help make the service easier to navigate and use. It is scheduled for release in mid-1994. (See "On the Front Lines.")

GEnie's broad selection of forums, called RoundTables (RTs), along with several real-time chat areas (RTCs) cover just about every subject under the sun. Borland, Microsoft, and WordPerfect are among the vendors participating in the computer area. Other professional forums include law, medicine, and real estate, and there are 14 hobby-related RTs as well. Note, too, that GEnie's rather crude forum interface requires you to learn at least a basic set of commands for selecting conversations, reading messages, and replying.



GEnie can be used through any standard comm program—in this case the Windows Terminal.

GEnie's mail service, GE Mail, is not as easy to use as some of the others. The menu choices for reading, for example, are unclear for novices, and creating a new message is slow and somewhat cryptic. You can attach a single file (via Xmodem only, although you can use Xmodem, Ymodem, or Zmodem for downloading), but GEnie doesn't have mailing lists or an on-line address book. You cannot specify priority delivery, nor can you get a receipt. GE Mail will, however, hold your unread messages for 30 days and the mail you have seen for 5 days. You can also download messages to your PC for storage—something only GEnie and CompuServe offer natively (Prodigy does so with its Mail Manager).

GEnie excels at research tasks. In addition to DJN/R and Dialog, you can access Dun & Bradstreet Corporate Profiles, the Thomas Register, and the Worldwide Patent Center, among many others. The GEnie NewsStand is a searchable database of the full text from more than 900 publications, including newspapers from nearly every major U.S. city, and nearly any periodical you can name. Remember though, that most of these are considered premium services, for which you pay extra. NewsStand, for example, costs from $2.50 to $29.00 per

FACT FILE

GEnie

General Electric Information Service, 401 N. Washington St., Rockville, MD 20850; 301-251-6415; fax 301-251-6421

Requires: 8088-based PC or better, any communications software, modem.

Telephone sign-up: 800-638-9636.

In short: As a professional service, GEnie is often overshadowed by its larger rival, CompuServe. But GEnie provides gateways to a wealth of business, financial, computer, and other information, as well as access to news and hundreds of publications. The service itself is inexpensive, but accessing third-party information like Dow Jones or Dialog can run up your bills.

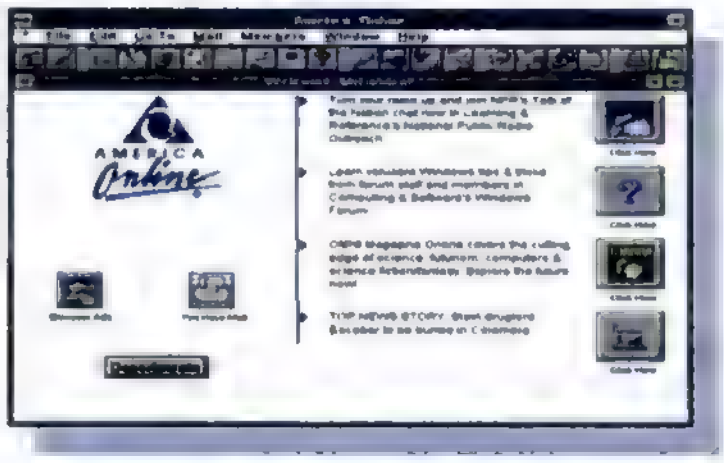
451 ON READER SERVICE CARD

SUITABILITY TO TASK

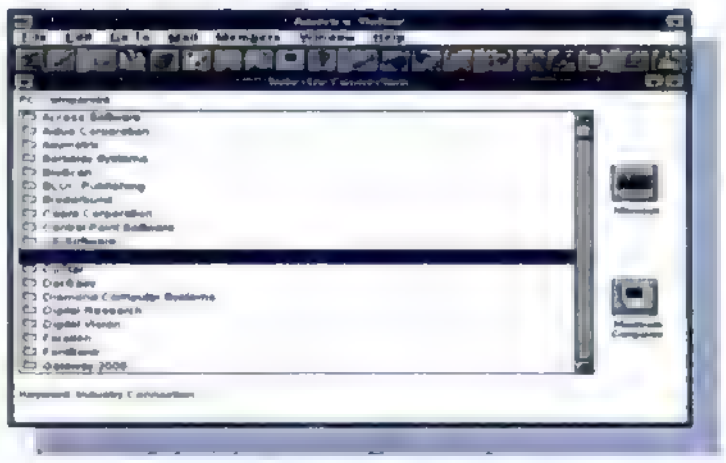
GEnie

	POOR	FAIR	GOOD	EXCELLENT
E-mail and communications	●	●	○	○
File downloads	●	●	●	○
Information databases	●	●	●	●
News and finance	●	●	●	●
Hobbies and entertainment	●	●	○	○

The More Windows You Open, The Cooler It Gets.℠

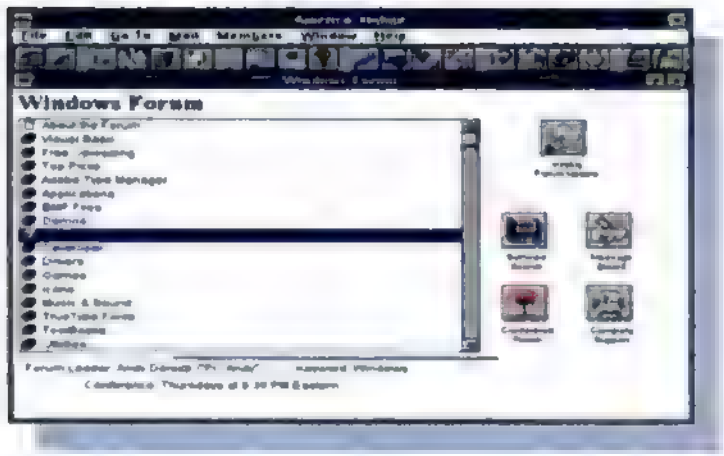


Microsoft Windows™ Interface



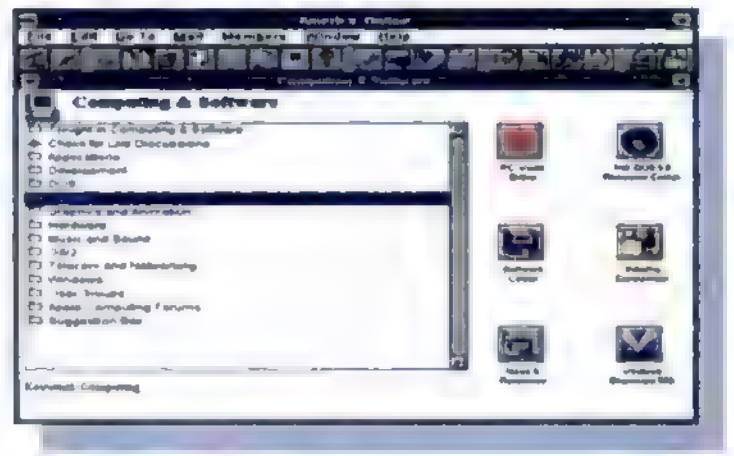
Expert Computing Advice

Internet Center

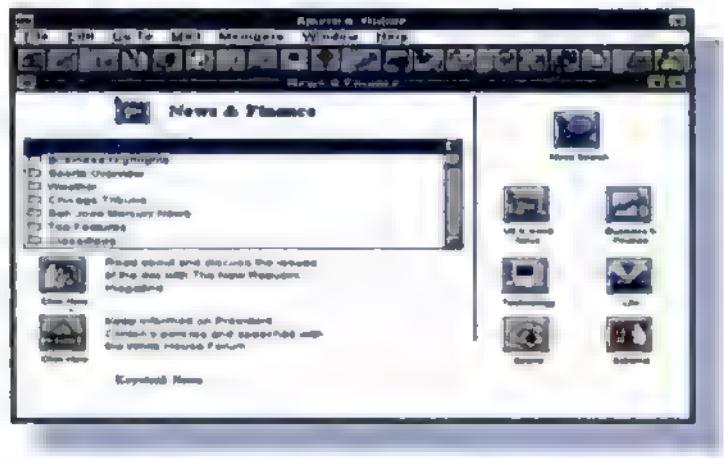


Windows Advice & Support

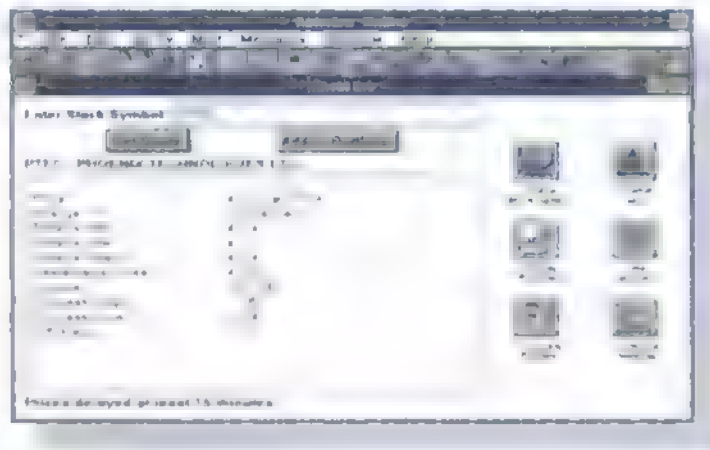
Fast, Easy Downloading



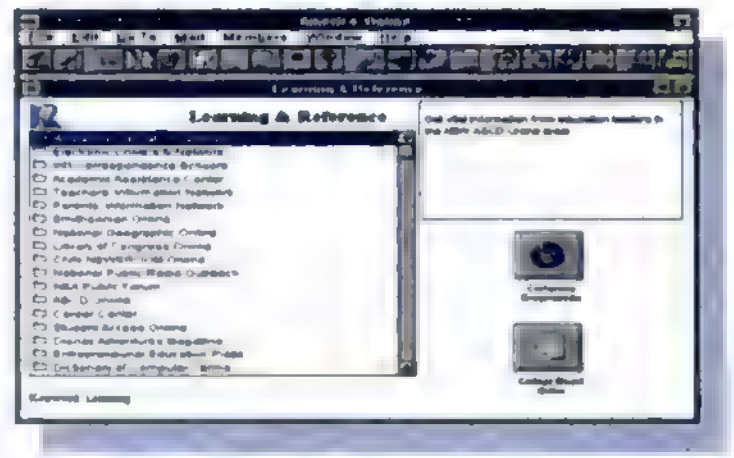
More Than 40,000 Software Files



Searchable News



Stock Quotes & Portfolio Management



Encyclopedia & Homework Help

Free Trial Offer. Clip and mail the card or fax it to 1-800-827-4595.

Yes! I'd like to try America Online — FREE.

Send me the free software and trial membership. I understand there's no risk — if I'm not completely satisfied, I may cancel without further obligation.

NAME

ADDRESS

CITY

STATE ZIP

( ) HOME PHONE

SELECT DISK TYPE AND SIZE—

Windows*: ❑ 5.25 ❑ 3.5

DOS: ❑ 5.25 ❑ 3.5 ❑ High Density ❑ Low Density

*To use America Online for Windows, you must have a 386 PC, 4MB of RAM, a VGA monitor, a mouse, a modem, and a working copy of Windows 3.1.

Use of America Online requires a major credit card or checking account. Limit one free trial per household. America Online is a registered service mark of America Online, Inc. Other names are service marks or trademarks of their respective holders.

8998/W

Try America Online — Free.

There's only one way to get the big picture about America Online. Try it. That's why we make it so easy. We give you the software and let you try it, absolutely free. You'll be impressed by everything you can do with your computer, a modem, and America Online, and how easily you can do it.

Just Point And Click.

Get advice from hardware and software developers, experts and reviewers — even ask them questions directly. Download any of the thousands of programs from our software libraries and use them offline. Monitor your investments and the latest news. Manage your business better with the help of our Microsoft® Small Business Center. Save time and money in hundreds of different ways, from browsing for gifts in our online shopping area or booking your own airline tickets to using our great computing support forums.

New Windows To Open All The Time.

America Online offers multi-file downloading, so you can select the files you want with the click of a button, then do something else while they're downloaded for you. When the downloading is finished, you'll automatically be signed off the service. Our e-mail gateway to the Internet links you to members of other e-mail and online systems for no additional cost. And new services are being added to America Online all the time. When you connect to America Online, you connect to the electronic community of the future — today.

As Easy To Try As It Is To Use.

If you've never tried America Online, now's the time. If you have in the past, try us again — America Online for Windows makes our service easier to use and more powerful than ever, with multi-tasking, flashbar navigation, and more. And if you don't use Windows yet, send back the postage-paid card anyway: we've got a version of America Online for you, too. But don't take our word for it. Give us a try and find out what you can accomplish when you open a few of our windows.

AMERICA Online

Complete and mail the card or call 1-800-827-6364, Ext. 8998, today!

NO POSTAGE NECESSARY IF MAILED IN THE UNITED STATES

BUSINESS REPLY MAIL
FIRST CLASS MAIL PERMIT NO. 9096 VIENNA, VA

POSTAGE WILL BE PAID BY ADDRESSEE

AMERICA Online®

8619 Westwood Center Drive
Vienna, VA 22182-9806

On the Front Lines

by Gary Gunnerson

There are two forms of on-line service front-end software. The first category, on-line browsers, make the services more navigable by using attractive interfaces to mask cryptic commands. The second category, off-line navigators, cut down on connect time by automating an on-line session. They allow you to retrieve selected information quickly and then read it off-line. They also let you create mail responses off-line and then connect to the service when you want to upload them.

We looked at more than 20 front ends to CompuServe and MCI Mail, as well as two for GEnie and two add-ons for Prodigy. We chose these packages based on market share and popularity. Some are distributed as shareware, and a few are still in the beta stage.

COMPUSERVE ON-LINE BROWSERS

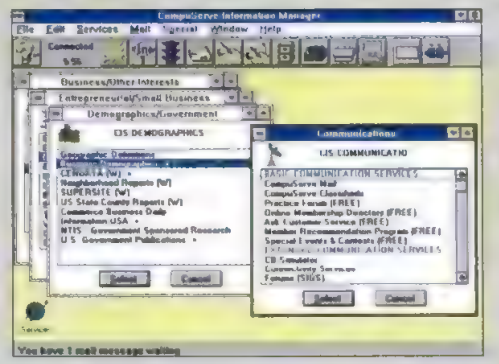
It is no coincidence that the interactive on-line browsers from CompuServe itself provide the best interfaces.

CompuServe Information Manager for DOS (DOSCIM) and for Windows (WinCIM) use CompuServe's Host Micro Interface (HMI) protocols to ensure reliable communications between PC and host. Although slower than straight terminal access to CompuServe, both packages use well-crafted menus to browse forums, visit favorite places, retrieve mail, and so on. They mask CompuServe's cryptic commands, transforming them into intuitive menu selections. On CompuServe, type GO DOSCIM or GO WINCIM at the $ prompt. Each program carries a $10 charge but comes with a $10 usage credit.

COMPUSERVE OFF-LINE NAVIGATORS

Most CompuServe off-line navigators concentrate on accessing e-mail, forum messages, and file-download areas. A few support the interactive services, such as business information, stock quotes, and weather. The idea behind these packages is that you log on in repeated sessions, first to retrieve "header information" alerting you to new things, and then a second time to retrieve the substance. At the same time you download the content, you can upload your own messages.

The CompuServe Navigator, Windows Version. This Windows-based package comes from CompuServe itself, and allows users to drag procedures from a list on one side of the screen to a script on the other. Based on the popular CompuServe Navigator for Macintosh, it's stable, easy to use, and inexpensive—the $30 download price includes a $10 usage credit. (GO CISSOFT.)



CompuServe Information Manager for Windows is that service's most popular on-line browser.

AutoSig. This is a good choice for the budget-conscious. It is sold as freeware and can run on a lowly 8088 machine. First created in the early 1980s, AutoSig has cultivated something of a cult following with third parties supplying communications scripts and programs. The user interface is excessively complex for a novice, but you can master it by dutifully studying the manual. The opening screen shows a list of CompuServe host selections on the left, forums on the right, and a list of function key commands down the middle. Things get progressively worse after that, and you need additional programs to handle off-line file and message management. (GO IBMCOM, library 1, ATOSIG.EXE; documentation in ATODOC.EXE.)

OzCIS. The latest release—Version 2.0—of Ozarks West Software's OzCIS is sold as shareware, with a $65 registration fee. It adds a full complement of pull-down menus to include many of the additional services, such as weather, stock quotes, and the "what's new" section. The program remembers which threads you track and automates the download of related conversations. (GO OZCIS, library 2, OZ2D1.EXE and OZ2D2.EXE.)

TapCIS. The Support Group's well-known shareware interface (registration is $79) is easier to use than AutoSig, and it's less memory intensive than OzCIS. An on-line menu rests above an off-line menu with a list of active forums shown at the bottom of the screen. Single-key commands activate appropriate subscreens or activities.

In addition to e-mail and forum tracking, TAPCIS has automation of library downloads as part of its repertoire. Although the DOS interface is tired-looking, the program is still quite useful. (GO TAPCIS, library 1; TAP.EXE; documentation in TAPDOC.EXE.)

TeePee and WigWam. Ashmount Research has two shareware off-line navigators, TeePee ($99.95) for DOS and WigWam ($130) for Windows. Designed to ease access to the forums and libraries, these user interfaces include pull-down menus, which, unfortunately, are often unclear. TeePee has a more complex menu structure than OzCIS or TapCIS have, and WigWam, while better, can also be cumbersome.

Through use of communications scripts, these packages can each automate retrieval of many of the non-forum CompuServe services. We

Continues

Front Lines

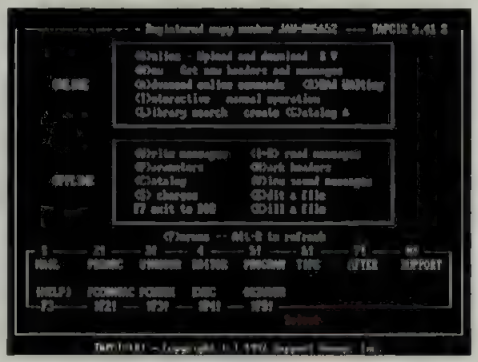
CONTINUED

found, however, that the default scripts do not handle a ZiffNet account well, for example, and that they may require tweaking to work appropriately. (TeePee: GO UKCOMP, library 10, TPEVAL.ZIP; documentation in TPMAN.ZIP. WigWam: GO UKCOMP, library 10, WIGWAM.ZIP; documentation in WWMAN.ZIP.

AcCIS. Prestige Consulting, best known for its AcCIS software for the HP95LX hand-held computers, built a nice Windows interface on its AcCIS software, but the underlying code is not ready yet. For example, version 3.0b bombed when we tried to modify entries in the address book. The installation process includes several manual procedures. Steer clear of this $55 shareware program for now. (GO WINSHARE, library 3; ACCIS.ZIP, ACCIS2.ZIP, and ACCIS3.ZIP; VBRUN100.DLL also required.)

FlexCIS. Now in Version 1.3, Object Evolution's $65 Windows-based shareware package shows an improvement over previous versions. Its opening screen depicts a logical view of the program's functions. However, oddities still abound. The Outbox item actually corresponds to future on-line activities; it would more appropriately be called a scheduler. In fact, the scheduler that is built into FlexCIS shows great promise for allowing specific access to forums—perhaps on certain days of the week, or on every log-on. This program may be worthy of future consideration, but for now it is plagued by difficulties when you try to read message threads, including an unacceptable number of "formatting error" messages. (GO WINSHARE, library 3, CISOBR.ZIP and CISSUP.ZIP.)

Journalist. For something completely different, PED Software Corp's $129.95 Windows-based Journalist creates a personalized newspaper view of CompuServe. Journalist works with CompuServe's news services to create a custom view of the latest headlines, as well as news from other parts of CompuServe. The concept is marred by slow communications protocols and the lack of a print preview function. Some nice additions would be the ability to filter stories and to include more than a single story in each text frame. Today, the program puts the first received story at the top of the list and in that print order; a ranking by personal interest would definitely appeal to busy people. (PED Software Corp., 800-548-2203.)



TapCIS is an old favorite among CompuServe subscribers, despite its DOS interface.

NavCIS Pro. The Windows version of Dvorak Development's NavCIS interface looks a lot like the WinCIM CompuServe browser. Buttons on the menu bar access a file finder, stock quotes, and weather functions. Drag-and-drop icons control actions. The DOS version of the program looks and functions exactly like the Windows version.

Beneath the attractive user interface we encountered problems. Selecting a delete button for a non-existent group in the address group dialog box generated a Windows General Protection Fault (GPF). In addition, on-line sessions sometimes required multiple passes to CompuServe when the program got out of synchronization with the host menus. This program is more polished than either FlexCIS or AcCIS, but it still needs work to justify the $99.95 registration fee. (GO NAVCIS, library 1, WNAVTE.EXE.)

WinCIS. This package from Logix Systems was in its beta version as we went to print. Even so, WinCIS provides one of the most stable and polished programs in the group. Its scheduling options let you work independently with sections of a forum to provide automated retrieval for some areas but only downloading headers for others.

Forum lists can be grouped by independent views. For example, you may want to set up an at-home view, a daily view, and a monthly view of the service. With the scripting language you can create new tasks and assign them to a button. (GO WUGNET, library 12; WC094A.ZIP, WC094B.ZIP, WC094C.ZIP, WC094D.ZIP, and WC094E.ZIP.)

MCI MAIL FRONT ENDS

Because MCI Mail is used predominantly for exchanging messages, its front ends focus on mail metaphors, with INBOX, OUTBOX, and DESK as their mainstays. They handle the storage and retrieval of messages, allow for easy attachment of binary files, and work to simplify the address books, gateway, and faxing complexities of MCI. One of the main differences among them is that some, such as The Wire, rely on a database foundation, letting you search the messages. Others, such as MailRoom, simply store the messages as discrete text files.

MCI Express. Once a Lotus Corp. product, DOS-based Express was a 220K TSR, but it now fits snugly in only 36K of memory. MCI Express has easy-to-use folder and addressing functions with unlimited storage for messages and folders. Message headers can be searched, and sending and receiving attachments is relatively straightforward. The user interface is no-frills, and there are some menu items, such as Message/Edit rather than simply Edit that will annoy you. Still, at $35 MCI Express is the most reasonable choice for DOS users of MCI Mail. (MCI International Inc., 800-444-6245.)

The Wire. SWFTE International's $99.95 The Wire provides a simple-to-

use menu bar, as well as a desktop of icons and file folders to store messages and the address book. The Windows software has drag-and-drop filing capability and implements regularly scheduled background connections. E-mail messages are stored in a database, and a long list of bug fixes has corrected some problems with the stability of the data. The Wire cannot retrieve on-line addresses from MCI Mail, and cannot access MCI's bulletin board features, but this package remains the most full-featured Windows interface available. A new version will fill in the blanks and is scheduled for release later this year. (SWFTE International Ltd., 800-237-9383.)

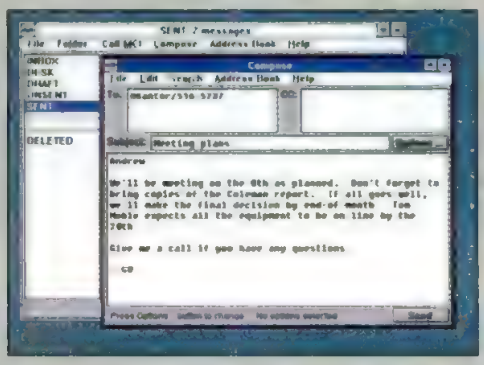
MailRoom. Sierra Solutions' MailRoom ($89) is one of the simplest Windows front ends for MCI Mail, allowing you to retrieve and store messages as text in discrete folders. It has no search capabilities, not even on header information. But you can easily create an address book, grab prior read messages from your desk, and retrieve information from MCI bulletin boards. Received attachments are saved in an enclosures directory—whether you like it or not. You can schedule calls every *x* hours, and MailRoom allows messages to be dragged and dropped between folders—a nice feature on an excellent program. A shareware version of the software is available on CompuServe (GO COMPSHOPPER, library 12, WNMAIL.ZIP), or directly from the company. (Sierra Solutions Inc., 310-478-2531)

MULTIMAIL SOFTWARE

Another solution that's becoming fashionable is the use of a *universal front end,* which allows you to send and receive e-mail from multiple services with a single package. This eliminates the need to learn a different package for each service you use.

CyberDesk. CyberDesk, from CyberCorp, is available for $395. It provides access to cc:Mail, CompuServe, MCI, MHS Mail, Microsoft Mail, the WELL, and WordPerfect Office. Although it does not have the easiest address book features or best-looking implementation, CyberDesk's versatility is admirable. Unlike The E-Mail Connection, the CyberDesk address book does not let you specify multiple routes for mail delivery. (CyberCorp, 404-424-6240.)

The E-Mail Connection. The E-Mail Connection ($99.95), from Connect Software, offers access to CompuServe, MCI, MHS mail, and Microsoft MAPI. It provides an attractive series of dialog boxes that allow you to customize your dealings with each of the various services. The E-Mail Connection automatically stores inbound messages to folders based on content—another important feature we are beginning to see in many standalone e-mail packages. The address book is thorough with multiple listings per person. Of course, the range of customization options also add to the complexity of setting up this package. Certain problems still persist. For example, the current X.PC implementation used to access MCI Mail limits that service to 2,400 bps. But the The E-Mail Connection developers seem anxious to continue improving the package. (Connect Software, 800-234-9497.)



MailRoom provides a clear, easy-to-use front end for MCI Mail.

RFD Mail. Performance Designs' shareware product RFD Mail claims to integrate e-mail from several locations seamlessly, including CompuServe, GEnie, MCI, VMS-Mail, and Unix systems. But what it really does is file multiple messages from myriad services. Unlike CyberDesk and The E-Mail Connection, RFD Mail cannot address a single mail message to multiple services, so if you write to many people on different services at once, you'll have trouble. Still, at $29.95 it's a reasonable choice for user-to-user correspondence. (CompuServe: GO WINSHARE, library 3, RFDMAI-.ZIP; documentation in FDDOC.ZIP.)

PRODIGY AND GENIE PRODUCTS

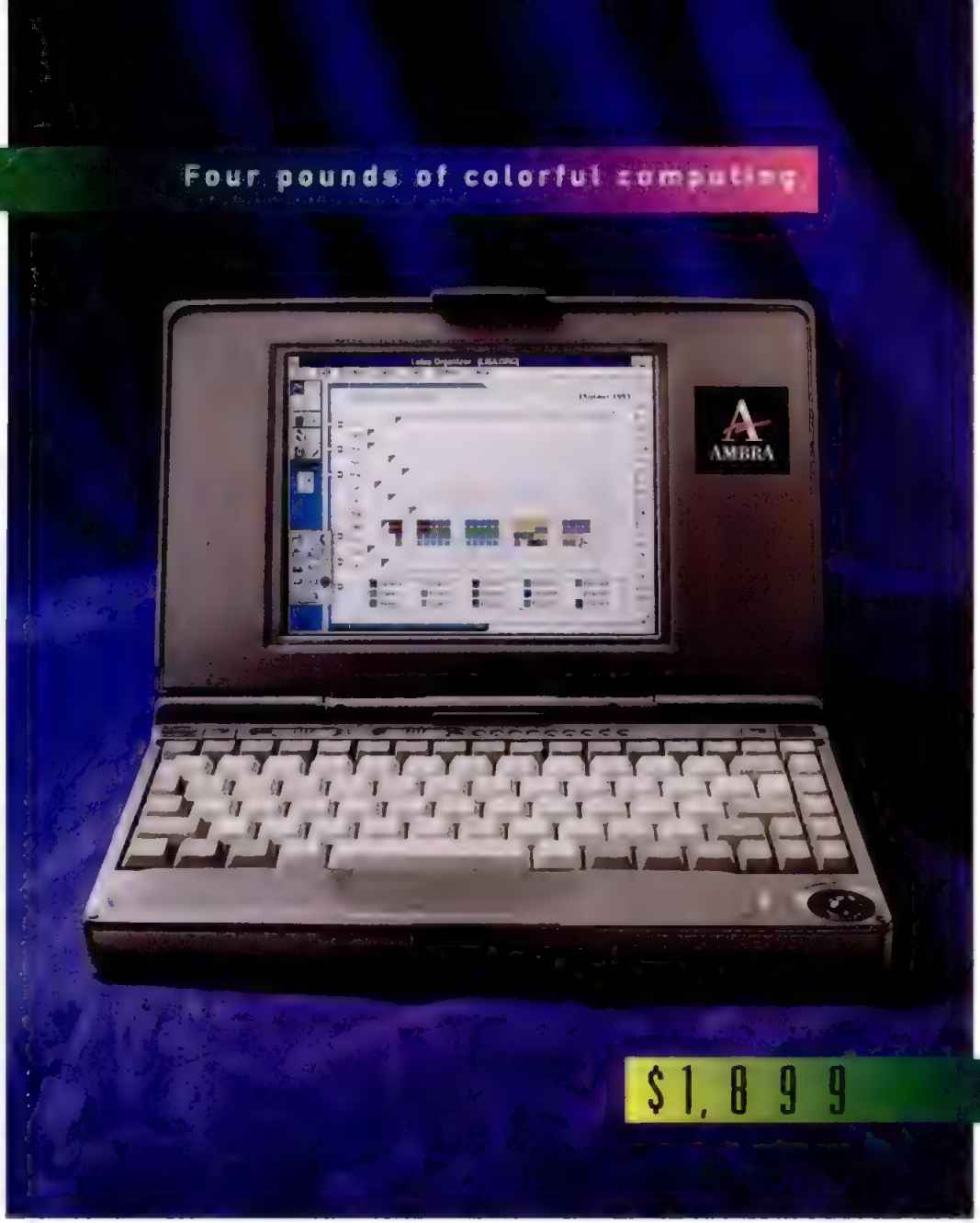
Besides CompuServe and MCI Mail, GEnie and Prodigy users also have a choice—although limited—of front-end software.

Aladdin. GEnie users usually access that service through a standard communications software package, using the service's straightforward, though unglamorous, menu system. But Aladdin, a shareware front end, makes navigating the service easier and less expensive. An off-line reader, Aladdin lets users choose RoundTables and messages to read and follow up off-line, reducing on-line charges. (On GEnie, enter ALADDIN at any command prompt.)

GEnie for Windows. Scheduled for release in late 1994, this graphical front end will make it easier for users to navigate the service's menu structure, including the cryptic RoundTables.

Prodigy Mail Manager. Prodigy's DOS-based off-line package lets you compose messages off-line and store file messages in folders, and it is required to send and receive messages to and from the Internet. Thanks to an odd pricing structure, messages that are composed on Mail Manager cost less than half as much to send as messages that are composed on-line. You can obtain the Mail Manager from Prodigy for $4.95 by JUMPing to MAIL.

Prodigy Bulletin Board Manager. Prodigy planned to start beta testing its Windows Bulletin Board Manager early in 1994. This program will download messages and read them off-line, compose notes for later uploading, upload in a single batch to multiple boards, and perform message browsing off-line. □



FREQUENT FLYERS AND LIFE-ON-THE-ROAD TYPES TAKE NOTE!

AMBRA™ mobile systems give you everything from speedy **486 processors** to **high-volume hard disk capacity**, to go! Choose a featherweight **(only 4 lbs!)** SN-Series notebook for full-function computing in color or mono. Or make yours a **high-performance** N-Series model with dual-scan DSTN or **active matrix color**. Whatever AMBRA you carry, you'll work in comfort at an **86-key keyboard** with **integrated trackball**. And benefit from power-saving Sleep mode or convenient **Suspend/Resume** capability. Take along your pick of **PCMCIA options** — fax/modem and more — for on-the-spot communications. Back in the office, let your notebook double as a desktop. Just plug into one of our optional **docking stations** to instantly and easily access computing resources throughout your company!

If your work keeps you on the move,

call AMBRA. Our new MOBILE SYSTEMS

pack lots of POWER yet travel LIGHT.

Firm confidence.
Every AMBRA comes with a 30-day money-back guarantee and a one-year limited warranty (optional Executive warranty also available).[1] And you can rely on toll-free technical support around the clock!

Full convenience.
To place an order or get more information, just call — weekdays 8 am to 11 pm, weekends 10 am to 7 pm (ET). We accept Visa,® MasterCard,® Discover® and American Express® — and purchase orders from qualifying businesses. Pick up the phone today!

"ROAD WARRIOR" OPTION BUNDLE: $386
For SN-Series: Includes PCMCIA 2.4/9.6 kbps fax/modem, extra battery, battery charger, carrying case

"QUICK DOCK" OPTION BUNDLE: $417
For SN-Series: Includes port replicator, 14" UVGA color monitor, full-size keyboard

"INSTANT OFFICE" OPTION BUNDLE: $927
For N-Series: Includes docking station, 15" FST color monitor, full-size keyboard

"TRAVELER" OPTION BUNDLE: $288
For N-Series: Includes PCMCIA 2.4/9.6 kbps fax/modem and extra battery

In Canada,[2] call 1-800-363-0066, Ext. 1465

SN-Series

FEATHERWEIGHT AND FULL FORCE.

SN425C
- 486SX, 25 MHz, SL-Enhanced
- 4MB RAM, max: 20MB
- 170MB removable hard disk
- 7.8" STN color screen
- 1 PCMCIA slot, Type II
- 86-key keyboard
- Integrated 16mm trackball
- MS-DOS,® Windows™ 3.1
- Slip case
- 4 lbs, including battery

$1,899
(With external 3.5" 1.44MB diskette drive, add $99.)

SN425
- 486SX, 25 MHz, SL-Enhanced
- 4MB RAM, max: 20MB
- 80MB removable hard disk
- 8.2" monochrome LCD
- 1 PCMCIA slot, Type II
- 86-key keyboard
- Integrated 16mm trackball
- MS-DOS, Windows 3.1
- Slip case
- 4 lbs, including battery

$1,299
(With 170MB hard drive, add $200 With external 3.5" 1.44MB diskette drive, add $99.)

N-Series

DAUNTLESS POWER BEYOND OFFICE DOORS.

N450T
- 486DX2, 50 MHz
- 8MB RAM, max: 12MB
- 3.5" 1.44MB diskette drive
- 200MB hard disk
- 9.5" TFT active matrix color screen
- 1 PCMCIA slot, Type III
- 86-key keyboard
- Integrated 16mm trackball
- MS-DOS, Windows 3.1
- Carrying case
- 6.6 lbs, including battery

$3,899

16mm trackball

N450C
- 486DX2, 50 MHz
- 4MB RAM, max: 12MB
- 3.5" 1.44MB diskette drive
- 200MB hard disk
- 9.5" DSTN dual-scan color screen
- 1 PCMCIA slot, Type III
- 86-key keyboard
- Integrated 16mm trackball
- MS-DOS, Windows 3.1
- Carrying case
- 6.6 lbs, including battery

$2,599

N433C
- 486SX, 33 MHz
- 4MB RAM, max: 12MB
- 3.5" 1.44MB diskette drive
- 120MB hard disk
- 9.5" DSTN dual-scan color screen
- 1 PCMCIA slot, Type III
- 86-key keyboard
- Integrated 16mm trackball
- MS-DOS, Windows 3.1
- Carrying case
- 6.6 lbs, including battery

$2,199

AMBRA™

1-800-200-1465

[1] Please call for details regarding AMBRA's money-back guarantee, limited warranty and Executive warranty. Return shipping and insurance charges are the responsibility of the customer. [2] Offerings may differ in Canada.

©1994 AMBRA Computer Corporation. AMBRA is a trademark of ICPI Ltd. and used under license therefrom. The AMBRA logo and logotype are trademarks of AMBRA Computer Corporation. MS-DOS is a registered trademark and Windows is a trademark of Microsoft Corporation. All other product names are trademarks or registered trademarks of their respective suppliers. Offerings, prices and products are subject to change without prior notice. Prices do not include shipping.

search, depending on the level of detail.

If your budget is limited, GEnie does carry general news from Reuters and computer-related stories on Newsbytes as part of its basic service. It has some good financial tools as well, including a database of trade names, an investment analyzer that tracks the stock market, and several forums for discussing your portfolio with experts and other investors.

If you need to do detailed research and you like the idea of having 300,000 to 400,000 people to discuss the information with, GEnie is the way to go.

Prodigy Services Co.

Prodigy Interactive Personal Service

BY ANDREW KANTOR

If you're looking for a personal on-line connection, and don't need the kind of detailed information available on CompuServe or Dow Jones, Prodigy is for you. This partnership of IBM and Sears, Roebuck & Co. remains the definitive home-user service, with everything from movie reviews to sports scores to recipes available at the click of a mouse button. But because it's a family-oriented service, Prodigy's information and tools are geared more toward the data browser than the serious business user or researcher.

The service has garnered a large following as the result of a successful ad campaign a few years ago ("You gotta get this thing!"). Indeed, with 2 million subscribers in over a million households, it's the largest commercial service.

Prodigy's new interface, in place since November 1993, better organizes what was once a seemingly rag-tag collection of services. A colorful graphics-intensive display shows the day's features, with buttons alongside for related topics.

The interface isn't perfect. It's crowded, for one. And Prodigy is the only one of these five services to display advertising on the screen. The interface also tends to slow operations considerably; the graphics must be sent over the phone line, which is trouble if you only have a 2,400-bps modem.

On Prodigy, which carries a $29.95 start-up fee, $14.95 per month gives you unlimited access to the basic features plus two hours of extra services. Beyond that, those features run $3.60 per hour, and if you send more than 30 e-mail messages, you'll pay $0.25 for each.

The service carries some excellent research tools for the home user, including *Grolier's Academic American Encyclopedia* and *Consumer Reports*. The Political Profile lets you find congressional biographies, voting records, and campaign contribution information. And you can track United States and international stock markets.

The news is timely, but the information is first edited in the service's newsroom before being posted. This makes Prodigy's news service more of an electronic newspaper than a news bureau.

Prodigy's new look, introduced in November 1993, allows easy access to all its services.

Prodigy was originally designed as an information provider—not a communications tool. Users were expected to want stock quotes, news, and recipes, and to do their shopping on-line. The bulletin boards and e-mail system were designed to give feedback to the merchants and providers. But the designers underestimated the average user's desire to communicate with others.

SUITABILITY TO TASK

Prodigy Interactive Personal Service

	POOR	FAIR	GOOD	EXCELLENT
E-mail communications	●	●	○	○
File downloads	●	○	○	○
Information databases	●	●	●	○
News and finance	●	●	○	○
Hobbies and entertainment	●	●	●	●

FACT FILE

Prodigy Interactive Personal Service

Prodigy Services Co., 445 Hamilton Ave., White Plains, NY 10601; 914-993-8000

Requires: 80286-based PC or better, 640K RAM, 4MB hard disk space, Prodigy software.

Telephone sign-up: 800-776-3449

In short: The better of the two personal on-line services reviewed, Prodigy is nevertheless plagued by a sluggish, sometimes hard-to-use interface and weak communications tools. It has improved much in the last year, however, and its information content—from business and politics to sports and movies—is excellent for individuals and all but the most serious business users

452 ON READER SERVICE CARD

Prodigy's communications tools have seen significant changes, although they are still the service's weakest point. Its e-mail facility is neither intuitive nor easy to use, and it has no interactive chat service (one is planned for spring 1994). Its bulletin boards are difficult to use, although the once-strict message guidelines have been relaxed.

Many e-mail and bulletin board processes require you to work your way through two or three dialog boxes. And even at 9,600 bps, Prodigy's graphics slow you down on the bulletin boards as you navigate topic areas, individual messages, and reply lists. You cannot simply choose a topic and page through the relevant messages; you must select a subtopic, then select replies, then page through those.

E-mail pricing now includes only 30 free messages per month. Internet e-mail was introduced in late 1993. Unfortunately, you have to pay for the Internet mail you send *and* receive.

Prodigy offers some shareware downloads, but only through ZiffNet. That carries an additional charge of either $7.50 or $14.95 per month (for 1 or 3 hours of connect time, respectively). Besides software, ZiffNet also provides help and advice on computer purchases and use from the editors of *PC Magazine, Computer Shopper, PC/Computing,* and *PC Week*.

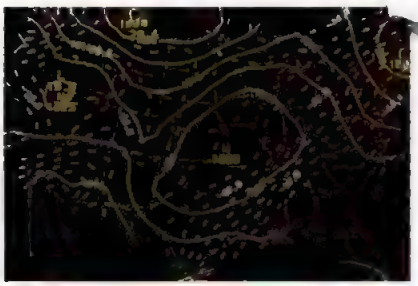
Despite its flaws, Prodigy is the service of choice for people who want basic information, simple communications, and an entry-level taste of the on-line world. □

Use The Internet Like A Pro.

Navigating the Internet Just Got Easier with WinGopher

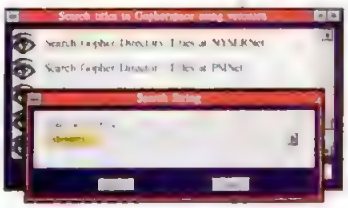
Have you wanted access to the Internet without the hassle of typing complicated addresses or memorizing file locations? Do you lose valuable time wandering through a maze of servers and unwanted files? Now you can organize and simplify your Internet access with WinGopher,™ a Microsoft® Windows™-based Gopher client.

Requirements for Gopher Clients	WinGopher
Uses Gopher Protocol	✓
Installation Support	✓
Users' Guide and Online Help	✓
Includes Text and Image Viewers	✓
Supports Windows Sound and Video Viewers	✓
Supports Phone Books	✓
Enhanced Bookmarks	✓
Views Multiple Open Servers	✓
Supports Winsock Compatible TCP/IP Stacks	✓
Microsoft Windows Interface	✓



View multiple servers at one time.

WinGopher provides you with a graphical interface that uses pull-down menus and point-and-click functionality for easy Internet navigation. Using the Gopher protocol, WinGopher supports Archie, Veronica, and WAIS searching. FTP transactions and Telnet sessions are supported, as well as any Windows sound or video viewer. An image viewer and text viewer are included with WinGopher.



Pop-up windows make searching easy.

Why WinGopher?

WinGopher is a fully supported product, including installation phone support, user documentation, online help, and an E-Mail bulletin board service. Backed by a leading automation firm, you're not left stranded should you need assistance.

Microsoft Windows Compatible

MICROSOFT WINDOWS COMPATIBLE

WinGopher works with other Windows applications and requires:

- Windows TCP/IP software and connection (Winsock 1.1 compatible)
- 386 PC or higher with Windows 3.1, DOS 5.0
- 3.5 MB disk space and 2 MB additional memory

Become a pro with WinGopher. Navigating the Internet has never been so easy.

$69.95

Call 1-800-55-NOTIS

FAX (708) 866-4970

EMail: wingopher@notis.com

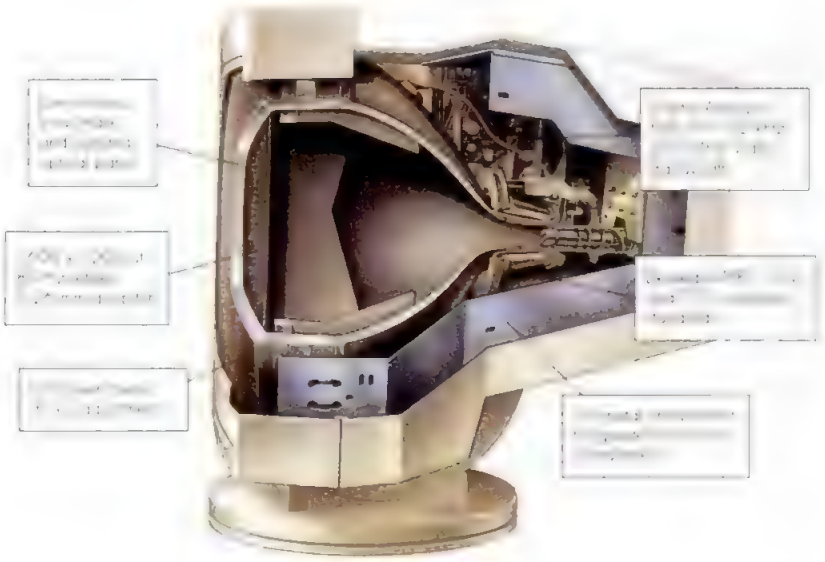
WinGopher

GRAPHICAL INTERFACE FOR THE INTERNET

NOTIS Systems, Inc. • An Ameritech Company • Evanston, IL 60201-3622

CIRCLE 858 ON READER SERVICE CARD

OUR MONITORS LAST SO LONG, WE'VE HAD TO EXTEND THE LIVES OF OUR CUSTOMERS.

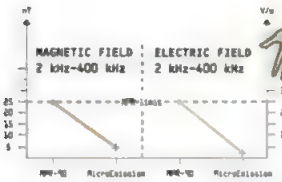


True, nobody's drawn a direct connection between video display emissions and longevity. But people are worried enough to have government-set limits on them. The strictest limits come from Scandanavia. So do the monitors that cut these emissions so low they can't even be measured: Nokia.

Nokia monitors with MicroEmission® far surpass even TCO*—the toughest emissions standards in the world—with bonded display panels and full metal encasement.

Fine. But what does that leave you to look at?

Well, Nokia MultiGraph® series monitors are arguably the most vivid in the world. In fact, the vast 21" unit achieves a 1600 x 1200 display at a remarkable 80 Hz refresh rate with 0.26 mm dot pitch. In other words: Huge, clear and absolutely flicker-free.



Nokia MicroEmission greatly reduces magnetic and electrical fields exposure below the current Swedish MPR-90 standards

The unique FullScreen® feature eliminates the dead border without edge distortion. The picture can be adjusted not just horizontally and vertically, but also trapezoidally and orthogonally. More impressively, the DigiControl™ on-screen menu-driven display adjustment can memorize your workstyle preferences (which is faster, easier, and far more precise than reaching for knobs hidden in the back somewhere.) And Nokia monitors offer user-defined PowerSaver™ which further reduces those wicked emissions. It also saves the tube and helps the whole unit last longer.

Before you buy your next monitor, look into a Nokia. It could be the decision of a lifetime. Call 1.800.BY NOKIA, Dept. ES for the dealer nearest you.

NOKIA

ENGINEERED IN EUROPE FOR THE WORLD

©1993 Nokia Consumer Electronics. MicroEmission, Multigraph, FullScreen, DigiControl and PowerSaver are trademarks of Nokia Consumer Electronics. *TCO is The Swedish Confederation of Professional Employees. All other trademarks are the sole property of their respective companies. The Energy Star emblem does not represent EPA endorsement of any product or service.

MAINSTREAM MONITORS

Through the Looking Glass

Which 14- or 15-inch Super VGA display is best for you? To help you make the right choice, *PC Magazine* evaluates 54 of today's mainstream monitors.

Whether you are buying a monitor for your old PC or as part of a new system, it pays to spend the time to pick the right one. Monitors and keyboards are the two components that have the most immediate impact on your interaction with a PC. But with so many mainstream monitors to choose from, evaluating the field is no easy task. This review of 54 of the current crop of 14- and 15-inch multifrequency monitors, priced from $299 to $839, will aid you in your quest.

by Don Crabb

Your first decision is whether to buy a 14- or 15-inch monitor. While 14-inch monitors make up an overwhelming majority of all shipping and installed monitors today (about 76 percent), the trend is shifting toward 15-inch and larger models. We recommend that users consider 15-inch models for working in the Microsoft Windows environment.

A 15-inch monitor generally offers about 10 percent more screen real estate than a 14-inch model. The actual available screen space on any monitor is a function of the live area as measured diagonally from one bezel to another. In this review, the 14-inch monitors' diagonal active

Photograph by Ernie Friedlander

IN THIS REVIEW

Aamazing CM-1528 176
Addonics C143 176
Addonics C152/LR 176
ADI MicroScan 3G 181
ADI MicroScan 3GP Low Radiation 181
ADI MicroScan 4G 181
ADI MicroScan 4GP Low Radiation 181
Amax Impression 3 181
Amax Impression 5 181
AOC Spectrum Series 4N 182
AOC Spectrum Series 5S 182
CTX 1561LR 182
Darius HRN-14VLP 187
Darius HRN-15VLP 187
Digital PCXBV-BC 187
Digital PCXBV-DE 187
ETC ViewMagic CA-1464SP 189
ETC ViewMagic CA-1565SP 189
GoldStar 1510 189
Hyundai HCM-447E 194
IBM 14P Color Monitor 194
IBM 15P Color Monitor 194
KFC CA-1508 200
KFC CM-1428MD2 200
Liberty CL-9015 200
MAG DX15F 202
Mitsuba M715VS 202
Mitsubishi Diamond Scan 15FS 207
Nanao FlexScan F340iW 208
NEC MultiSync 3V 209
NEC MultiSync 4FGe 209
Nissei Sangyo/Hitachi Superscan 15S 211
Nokia Multigraph 44BS 214
Nokia Multigraph 449E 214
Optiquest 1500D 217
Orchestra MultiSystems' The French Horn 218
Orchestra MultiSystems' The Trombone 218
Packard Bell PB8515SVGL 219
Packard Bell PB8549SVGL 219
Philips Brilliance 15 220
Relisys RE-1564 221
Relisys TF-1560 221
Sampo AlphaScan 15 223
Sampo AlphaScan 15e 223
Sampo AlphaScan Plus 223
Samtron SC-528UXL 224
Sceptre CC-615L 202
Sigma Designs Ergo View 15 224
Sony CPD-1430 228
TVM Low Radiation 4A+ 230
ViewSonic 15 230
Wen JK1565 Color Monitor 231
ZDS ZCM-1440-UT 214
ZDS ZCM-1540-UT 214

screen sizes ranged from 12.4 to 13.5 inches, while the active screens of the 15-inch monitors we tested measured 13.3 to 14 inches diagonally.

Because the difference in manufacturing costs for 14- and 15-inch monitors has narrowed in the last year, more 15-inch models of all types are being sold than a year ago. According to Dataquest, a market-research company based in San Jose, California, about 15.5 million 14-inch monitors were sold worldwide in 1992, versus about 750,000 15-inch monitors. But Dataquest predicts that in 1996 about 7.5 million 15-inch monitors will be sold, versus 3.3 million 14-inch monitors.

SVGA OVERTAKING VGA

A year ago, the mainstream monitor was a 14-inch VGA-only tube. Today, the mainstream monitor is a 14- or 15-inch Super VGA display (800-by-600 resolution) or better. Many PC manufacturers now bundle 14- or 15-inch Super VGA monitors with their systems.

Multifrequency monitors are able to run in a variety of screen resolutions (VGA, Super VGA, and 1,024-by-768), so you can change screen settings in Windows 3.1 to provide more or less window space and larger or smaller icons, menu bars, and text.

In 1993, VGA-only monitors outsold multifrequency monitors by 7 million to 4 million in the U.S., according to International Data Corp. (IDC) of Framingham, Massachusetts. Those figures will be reversed by 1996, with 1994 being the year the pendulum swings toward multifrequency models, IDC says.

Optimum resolution for 14- and 15-inch models is 800-by-600. Although 14- and 15-inch models can run at 1,024-by-768 and even 1,280-by-1,024, text and graphics are too tiny at these resolutions.

If you want to do desktop publishing or other graphically intensive work, a 17-inch monitor or larger is the way to go, because it will offer a truly usable 1,024-by-768 resolution, as well as a marginally usable 1,280-by-1,024 mode.

Although no 14- or 15-inch monitor can substitute for a 17-inch or larger unit, the smaller models are generally one-third to one-half the price of 17-inch units. And as we discovered by lugging monitors around ZD Labs, 14- and 15-inch monitors take up a lot less desk space and are easier to maneuver and set up than larger models.

The 20 14-inch models we tested are list-priced from $299 to $700, while the 34 15-inch units we tested list from $399 to $839. Our most recent review of 17-inch monitors ("A Wider View," *PC Magazine*, September 14, 1993) found that those units' list prices ranged from $899 to $1,699.

The differences between the best and worst 14- and 15-inch multifrequency monitors we tested were considerably smaller than the differences found in our last mainstream monitor roundup ("Mainstream Choices," *PC Magazine*, March 16, 1993). This time, we found many solid units that we would be very happy to live with. These include models from ADI Systems, Digital Equipment Corp., NEC Technologies, Nokia Consumer Electronics, Optiquest, Sony Electronics, ViewSonic, and Zenith Data Systems.

Of these, we chose the NEC MultiSync 4FGe, the Nokia Multigraph 449E, the Optiquest 1500D, and the Sony CPD-1430 as Editors' Choices, because of their excellent objective scores and our experience with them in subjective testing. Each of these monitors provides a truly excellent image with a minimum of defects.

REVIEW CRITERIA

For this roundup, we accepted only 14- and 15-inch multifrequency monitors. These units had not been reviewed previously by *PC Magazine*. Each of the tested monitors had to be capable of supporting at least Super VGA resolution at Video Electronics Standards Association (VESA) refresh specifications. We re-

Our Contributors: DON CRABB is a contributor to *PC Magazine*. BRUCE BROWN, ALFRED POOR, and JOHN R. QUAIN are contributing editors of *PC Magazine*. MICHAEL NEUBARTH was the associate editor in charge of this story, and KATIE BARNES was the project leader.

quired products to be shipping to end users in the U.S. in reasonable quantities by our testing start date. We only reviewed true production units and did not test beta versions.

Compliance with MPR II emissions standards, VESA DPMS power-saving specifications, or the EPA's Energy Star standards was not required for inclusion in this roundup. But we did evaluate all of the monitors against these standards and reported our findings.

Some 14- and 15-inch monitors that would have qualified for the review were not available by our test dates—including displays from Acer America Corp., Amdek Corp., Arche Technologies, Compaq Computer Corp., Dell Computer Corp., First International Computer Corp., Idek/Iiyama North America, KEC America, Portrait Display Labs, Samsung Electronics America, Sunshine 99, Tatung Co. of America, and Wyse Technology.

EDITORS' CHOICE

- **NEC MultiSync 4FGe**
- **Nokia Multigraph 449E**
- **Optiquest 1500D**
- **Sony CPD-1430**

We found that, with two exceptions, the 54 14- and 15-inch mainstream color monitors tested by ZD Labs performed adequately at VGA and Super VGA resolutions. On the basis of objective instrument-based testing and subjective reviewer observation, we found seven monitors that were superior performers.

Four of these merit Editors' Choice awards: the NEC MultiSync 4FGe, Nokia Multigraph 449E, Optiquest 1500D, and Sony CPD-1430. Three deserve honorable mentions: the Digital PCXBV-DE, ViewSonic 15, and ZDS ZCM-1540-UT.

The 15-inch NEC MultiSync 4FGe had the best composite score of all reviewed monitors, and NEC Technologies was one of two monitor vendors to receive the highest Readers' Report Card grade of A on our last Service & Reliability survey (MAG InnoVision was the other). But the 4FGe is not cheap, with a $755 estimated street price. Because of its polished face, you'll want to spend another $70 (street price) for a glare shield.

The Nokia Multigraph 449E, at $630 list price, was another fine performer. This is the monitor to buy if you want to save energy with an existing PC. Without the aid of additional hardware, this 15-inch Nokia monitor can throttle back to as little as 4 watts when the PC is in its maximum power-saving mode.

The best buy among our Editors' Choice winners is the Optiquest 1500D. A 14-inch monitor with an estimated $399 selling price, the 1500D also had top-10 scores on our objective tests.

The 14-inch Sony CPD-1430 was the third-best performer in testing and is ruggedly built. Sony Electronics earned a B on our Readers' Report Card (Nokia and Optiquest did not receive enough responses to be rated). The Sony CPD-1430 is the only Editors' Choice award–winning monitor that doesn't follow VESA's DPMS specification and is not Energy Star–certified.

Among those monitors receiving an honorable mention, the 14-inch Digital PCXBV-DE had great test scores, good subjective ratings, and a small screen. The ViewSonic 15, which also had good objective test scores and excellent subjective ratings, is a good value, at $549 list. While the ZDS ZCM-1540-UT is the twin of the Nokia Multigraph 449E, reviewers found that our sample unit was a notch lower in subjective evaluations.

The remaining monitors were all adequate in varying degrees, except for the Hyundai HCM-447E and Packard Bell PB8549SVGL. The samples we tested were substandard on both subjective and objective measurements.

GREENING OF MONITORS

Energy-saving features are beginning to be incorporated into monitors, and competitive pressure will eventually cause energy-saving capabilities to become standard fare. Of the 54 monitors we tested, 15 offered Energy Star and VESA Display Power Management Signaling (DPMS) compliance, and four offered Energy Star compliance only (for more information, see the Summary of Features table). Wen Technology Corp. offers Energy Star power-saving capabilities as a $20 option on its 15-inch Wen JK1565 Color Monitor.

To qualify as Energy Star–compliant, monitors must be able to power down to 30 watts or less when not in use. In addition, VESA has provided its DPMS specification, which serves as a guideline to manufacturers for providing power-down features. The DPMS specification offers a standard method for monitors to power down in a series of decreasing energy-usage steps, as well as a method for sensing the vertical- and horizontal-frequency signals that trigger the power-down responses.

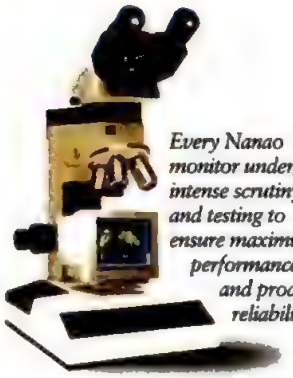
The DPMS specification defines four monitor power-usage modes: Maximum, Standby, Suspend, and Off. Each step uses less power (measured in watts). Users must install special video card drivers (available from video card vendors) to signal Energy Star– and DPMS-compliant monitors. Exceptions are the Nanao, Nokia, and ZDS monitors, which use the "screen-blanking method" to power down without the use of additional hardware, although screen blanking software is required. (For more information about the Energy Star program and related "green" computing issues, see "The Green Machine," *PC Magazine*, May 25, 1993.)

WHAT'S THE FREQUENCY?

Monitors and graphics adapters speak to each other mainly in terms of frequencies. The graphics card sends out RGB, horizontal, and vertical sync signals to the dis-

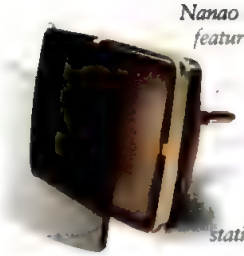
Get Up To $100 Cash Back*

Superior In Every Detail.



Every Nanao monitor undergoes intense scrutiny and testing to ensure maximum performance and product reliability.

At Nanao, details make all the difference in creating our family of professional display monitors. From the product design and manufacturing that takes place in our factory to the end user's working environment, Nanao pays attention to every detail. In engineering. Assembly. Product testing. Quality control. Shipping. Customer support. From the very first days of the company, we set out to be an innovator in monitor technology. And, in a few short years, we have achieved that goal. Today, Nanao has the lowest repair rate in the monitor industry, the highest product reliability, and a fast-growing number of enthusiastic customers. So if you're looking for a superior monitor, start with the details. We do.



Nanao monitors feature protective coatings and panels that reduce glare and eliminate static electricity.

Nanao T Series and F Series monitors have captured every major award from the industry's leading publications.

Nanao was the first monitor company to join in partnership with the EPA Energy Star Program.

3 YEAR WARRANTY

Model	Size	Dot Pitch	Scan Frequency	Recommended Resolution
T660i	20"	0.30mm	H 30~92kHz V 55~90Hz	1280x1024
T560i	17"	0.25mm	H 30~92kHz V 55~90Hz	1280x1024
F780i-W	21"	0.26mm	H 45~120kHz V 55~120Hz	1600x1200
F760i-W	21"	0.28mm	H 30~76kHz V 55~90Hz	1280x1024
F560i-W	17"	0.26mm	H 30~92kHz V 55~90Hz	1280x1024
F450i-W	17"	0.28mm	H 27~69kHz V 55~90Hz	1024x768
F340i-W	15"	0.28mm	H 27~64kHz V 55~90Hz	1024x768

Our monitor family teams ultra high resolution with a list of impressive technical specifications.

A heritage of precision craftsmanship and attention to detail has been designed into Nanao's family of display monitors.

1-800-800-5202

NANAO®

NANAO USA CORPORATION
23535 Telo Avenue, Torrance, CA 90505
(310) 325-5202 Fax: (310) 530-1679

CIRCLE 283 ON READER SERVICE CARD

*Expires 3/31/94. Cash back varies with model. Ask your reseller for details. Superior in every detail is a registered trademark of Nanao Corporation. All product names are trademarks of their respective companies. © 1994 Nanao USA Corporation. The Energy Star emblem does not represent EPA endorsement of any product or service.

HIGHLIGHTS

Mainstream Monitors

WE TESTED 54 14- and 15-inch multifrequency color monitors. There were 20 14-inch models, which ranged in price from $299 to $699, and 34 15-inch models, which were priced from $399 to $839. In contrast, 17-inch monitors begin at around $899.

EXCEPT FOR THE VERY WORST performers in this group, the overall quality of the monitors was higher among this field of entrants than in recent roundups of mainstream and 17-inch monitors. Most of the monitors in this roundup posted good numbers on our tests and favorably impressed our reviewers.

EDITORS' CHOICE awards were garnered by the NEC MultiSync 4FGe, Nokia Multigraph 449E, Optiquest 1500D, and Sony CPD-1430. These monitors were the top performers in this roundup.

ALTHOUGH MANY of the 14- and 15-inch monitors we reviewed are capable of operating at 1,024-by-768 and 1,280-by-1,024 resolutions, we believe the optimum resolution for 14- and 15-inch monitors is 800-by-600. Information on the screen is too small at higher resolutions.

ALTHOUGH 14-INCH MONITORS still vastly outnumber 15-inch displays, the price/performance ratio is increasingly favoring the larger units. We advise users to consider 15-inch monitors especially for computing under Microsoft Windows.

THIS YEAR marked the appearance of the first energy-saving monitors that conform to Energy Star and VESA power-conservation requirements. There were 15 monitors in this review that were Energy Star–compliant and VESA DPMS–compliant, and four that were Energy Star–compliant only.

USERS MUST INSTALL special video card drivers (attainable from video card vendors) to enable their PCs to utilize Energy Star and VESA features. Exceptions are the Nanao, Nokia, and ZDS monitors, which provide internal power-down capabilities that do not require additional drivers.

DIGITAL CONTROLS increasingly are becoming standard on 14- and 15-inch monitors. This year's crop featured more units with microprocessor-driven controls than last year's did.

play and the display's electron guns draw screens one horizontal line at a time, from left to right. The guns must make several hundred horizontal passes for each complete frame.

The number of lines the monitor draws on the screen per second is the *horizontal scanning frequency,* or *line frequency.* The number of frames the monitor draws per second is called the *vertical scanning frequency, refresh rate, or frame rate. Bandwidth,* measured in MHz, is an expression of the number of dots that a monitor can display in a line per second.

In general, the greater the bandwidth, the better the monitor. Typical bandwidths for current monitors are 18 MHz for VGA models and 35 MHz for SVGA models.

Because many horizontal lines must be drawn before one vertical cycle is complete, horizontal frequency is described in kilohertz (kHz), while vertical frequency is expressed in hertz (Hz). VESA has established minimal recommended vertical refresh rates that have become standards. For 640-by-480 and 800-by-600 resolutions, VESA recommends a 72-Hz refresh rate, while for 1,024-by-768, it recommends 70 Hz.

A color monitor with a vertical scanning range of 55 Hz to 80 Hz and a horizontal range of 30 kHz to 60 kHz provides a comfortable combination of backward compatibility with an older video card and current compatibility with a new one. If you want to extend the useful life of your new monitor, buy a model with a broader frequency range—say, 50 Hz to 120 Hz vertical and 30 kHz to 62 kHz horizontal.

The trend toward multifrequency capability (actually multiple sets of fixed frequencies) and 15-inch and larger monitors is directly linked to the rise in popularity of graphical user interfaces (GUIs), particularly Microsoft Windows 3.1.

DOT PITCH AND REFRESH RATES

Pay attention to a monitor's vertical refresh rate and its dot pitch. These numbers can help you avoid grainy graphics and screen flicker. Dot pitch refers to the space between the individual dots or picture elements (pixels) that make up a screen. A larger dot pitch produces a grainier, less focused image; a smaller dot pitch produces a sharper image. When shopping for a 14- or 15-inch monitor, look for a dot pitch of 0.28 mm or smaller. All monitors we tested except the Sony CPD-1430 and the ViewSonic 15 had dot pitches of 0.28 mm.

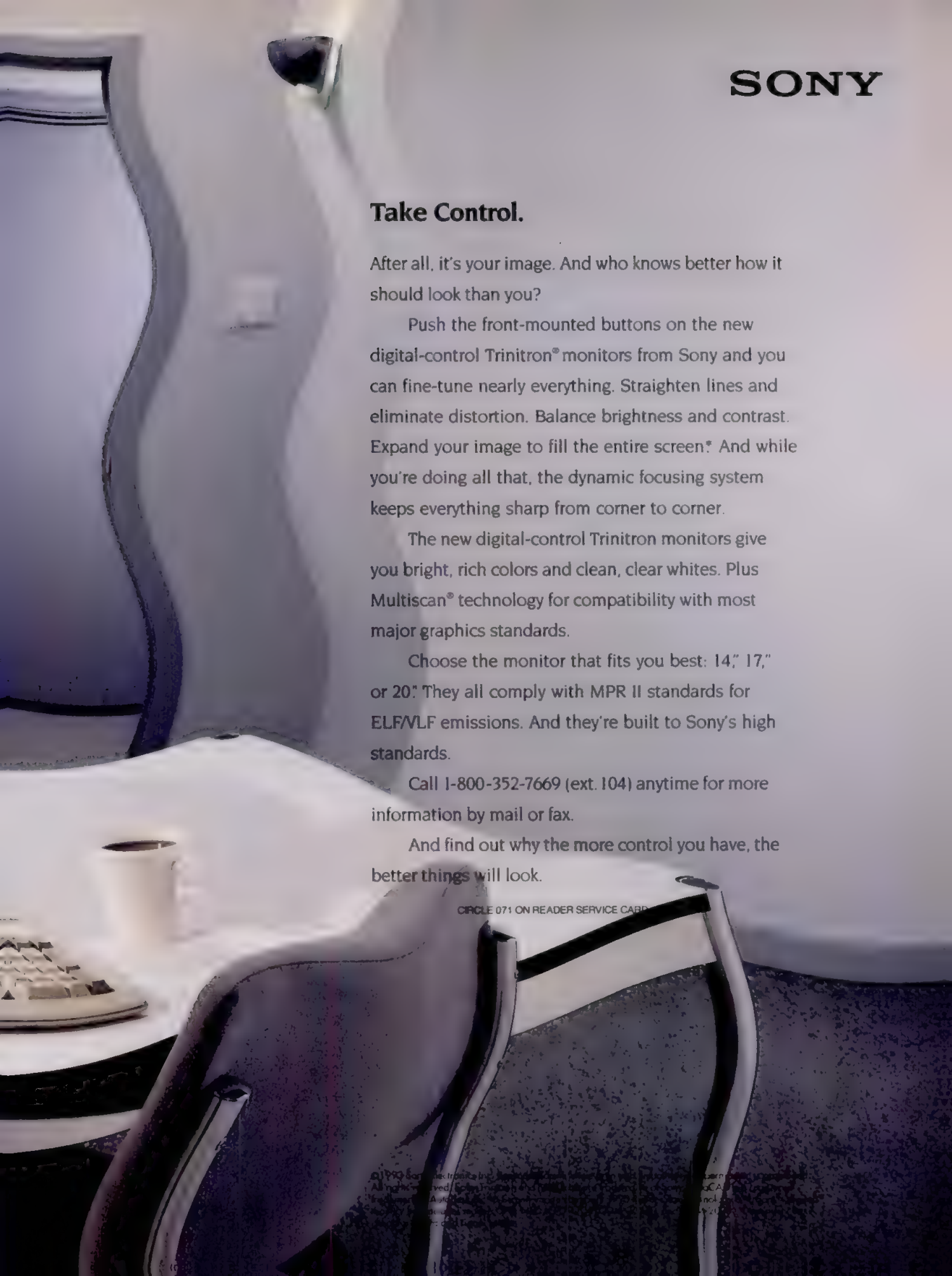
Sony's Trinitron picture tube does not have a dot pitch per se. Instead of using a shadow mask (as do all the other monitors in our tests), the Trinitron tube uses a stripe mask (or aperture grill). The space between the stripes is sometimes mistakenly referred to as dot pitch. Only one of the units we tested used Trinitron technology—the Sony CPD-1430, with an aperture grill pitch of 0.25 mm. The ViewSonic 15's tube offered a 0.27-mm dot pitch.

INTERLACED VS. NONINTERLACED

Even the smallest dot pitch won't eliminate the annoyance of a flickering monitor. Screen flicker results from a slow screen refresh rate or from *interlacing,* which refreshes only every other line of the screen, then fills in the remaining lines in a second pass. Some monitors flicker so badly that they can cause users eyestrain and headaches.

Noninterlaced (or progressive-scan) monitors refresh the entire screen in one pass. The easiest way to avoid screen flicker is to buy a noninterlaced monitor with a high vertical refresh rate, paired

Trinitron
SONY



SONY

Take Control.

After all, it's your image. And who knows better how it should look than you?

Push the front-mounted buttons on the new digital-control Trinitron® monitors from Sony and you can fine-tune nearly everything. Straighten lines and eliminate distortion. Balance brightness and contrast. Expand your image to fill the entire screen.* And while you're doing all that, the dynamic focusing system keeps everything sharp from corner to corner.

The new digital-control Trinitron monitors give you bright, rich colors and clean, clear whites. Plus Multiscan® technology for compatibility with most major graphics standards.

Choose the monitor that fits you best: 14," 17," or 20." They all comply with MPR II standards for ELF/VLF emissions. And they're built to Sony's high standards.

Call 1-800-352-7669 (ext. 104) anytime for more information by mail or fax.

And find out why the more control you have, the better things will look.

CIRCLE 071 ON READER SERVICE CARD

ZD Labs Benchmark Tests: Mainstream Monitors

The 54 mainstream monitors in this roundup were tested at ZD Labs using a comprehensive array of examinations that determine how well a monitor's display can handle a variety of imaging aspects. The monitors with the highest composite scores exhibited a well-balanced display, with little image distortion. The NEC MultiSync 4FGe garnered top honors with its composite score.

What the Numbers Mean

Objectively measuring monitor quality is not an easy task. It requires not only a substantial time investment but also specialized equipment. We used MicroVision's industry-recognized SuperSpot 100 to measure monitor performance to the tiniest detail. The top-scoring monitors had sharp, bright, uniform-looking displays, with little geometric distortion.

Although there were no clear runaway winners in this roundup, we did see some excellent performers. The NEC MultiSync 4FGe did well on all our tests and therefore had a first-place score, but it was not the top performer on any one particular test. It also has a distinct advantage for sharpness, clarity, and brightness, because it has no antiglare treatment. Some antiglare treatments blur text and allow less light through, which can be a slight bother but is nothing compared with the annoyance of having no antiglare treatment, which makes the monitor reflect everything like a mirror.

For an additional $70 (street price), the MultiSync 4FGe comes with an OCLI-coated lens that you fasten to the front of the case. Although this lens alleviates the reflection problems from behind, the air gap between it and the panel allows for some internal reflection, resulting in slightly decreased brightness and sharpness.

It is best, however, to have the antiglare treatment bonded to the screen, as do some of the other top-notch performers: the Digital PCXBV-DE, Nokia Multigraph 449E, Sony CPD-1430, and ZDS ZCM-1540-UT. All these displays were sharp and well focused, with more than acceptable brightness levels.

The Hyundai HCM-447E and Packard Bell PB8549SVGL were by far the worst performers in the field. The PB8549SVGL also had a very dim display and a barely acceptable average MTF score. On the other hand, the Hyundai produced a nearly average brightness score and exhibited poor convergence. Other poor performers include the Darius HRN-14VLP, Liberty CL-9015, Nissei Sangyo/Hitachi SuperScan 15s, and Relisys RE-1564, which all had the worst convergence of the tested monitors.

While objective scores are essential in determining which monitor to buy, remember that there are important qualities that the SuperSpot 100 cannot measure. A monitor's controls and adjustability, as well as its ease of use and aesthetics, contribute greatly to your satisfaction. We therefore had a panel of expert reviewers critique the monitors; their subjective comments and opinions are at least as important as the test results presented here.

How We Tested

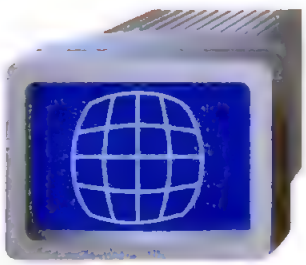
For this roundup of monitors, ZD Labs used a Northgate SlimLine SP 433 with an ATI Graphics Ultra Pro video adapter. We set the resolution to 800-by-600 with 256 colors and used a 72-Hz vertical refresh rate. We used three pieces of equipment for data collection: a MicroVision SuperSpot 100 for testing the modulation transfer function, misconvergence, and pincushioning; a Newport Optical Table to isolate the SuperSpot and each monitor from external vibrations; and a Minolta Color Analyzer CA-100 to measure the maximum usable brightness of each monitor.

The **Average MTF** (Modulation Transfer Function) can be loosely defined as the ratio of contrast to maximum usable brightness; it serves as an indicator of a monitor's sharpness. Large bands of black and white lines will appear sharp on most monitors, but as these lines get thinner and more closely spaced, a monitor has more difficulty resolving them. A sharp monitor will have a high level of black-and-white contrast even when displaying closely spaced lines.

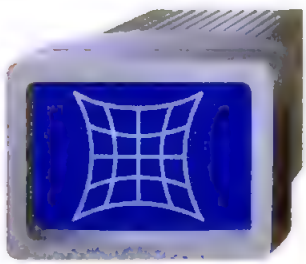
To test this quality, we have each monitor display a pattern consisting of alternating 1-pixel-wide black and white vertical lines. This is the most difficult pattern for a monitor to resolve, and we use this test as a worst-case scenario. Maintaining sharpness is much easier at lower resolutions, so we test at 800-by-600, since most users would use this resolution with a 14- or 15-inch monitor. Inferior monitors tend to blur this pattern, producing an image with a gray appearance overall. We adjust the contrast and brightness levels to achieve the largest possible MTF and record the result. We then display a pattern of horizontal lines, and we report the average of the two results. A higher score

Common Monitor Problems

Misconvergence Misalignment of one or more of the three electron beams (red, green, blue), which makes them pass through the wrong apertures in the monitor's shadow mask.



Barreling A common geometric distortion that occurs when the displayed image deviates from its intended shape in such a way that its sides appear to be convex



Pincushioning A concave geometric distortion; the opposite of barreling.

reflects a better ability to represent fine detail, most noticeable in the crisp display of text. A monitor with an average MTF score below 35 percent is not recommended for intensive writing work.

As the monitor's brightness is increased, the electron beams that scan across the screen become brighter. At some point this increase will adversely affect the focus of the monitor, causing the image's color to bleed. The **Maximum Usable Brightness** is a measure of the screen's luminance at the brightest point before the MTF value begins to drop. We use Minolta's Color Analyzer to measure the monitor's luminance. Although a maximum usable brightness of 20 or more foot-lamberts is acceptable, a higher number means that you can more easily fine-tune images for different lighting conditions.

A monitor displays color by means of an internal phosphor coating consisting of fine dots (for a shadow mask) or thin lines (for a Sony Trinitron unit) made up of three types of phosphors, which produce red, green, and blue light when excited by electron beams. Monitors typically use a separate beam for each phosphor type. When these beams are misaligned, colored halos appear around on-screen objects. This phenomenon is called *misconvergence* and is usually most apparent at the corners of the screen, where the electron beams have been most subject to deflection from their origin behind the center of the screen.

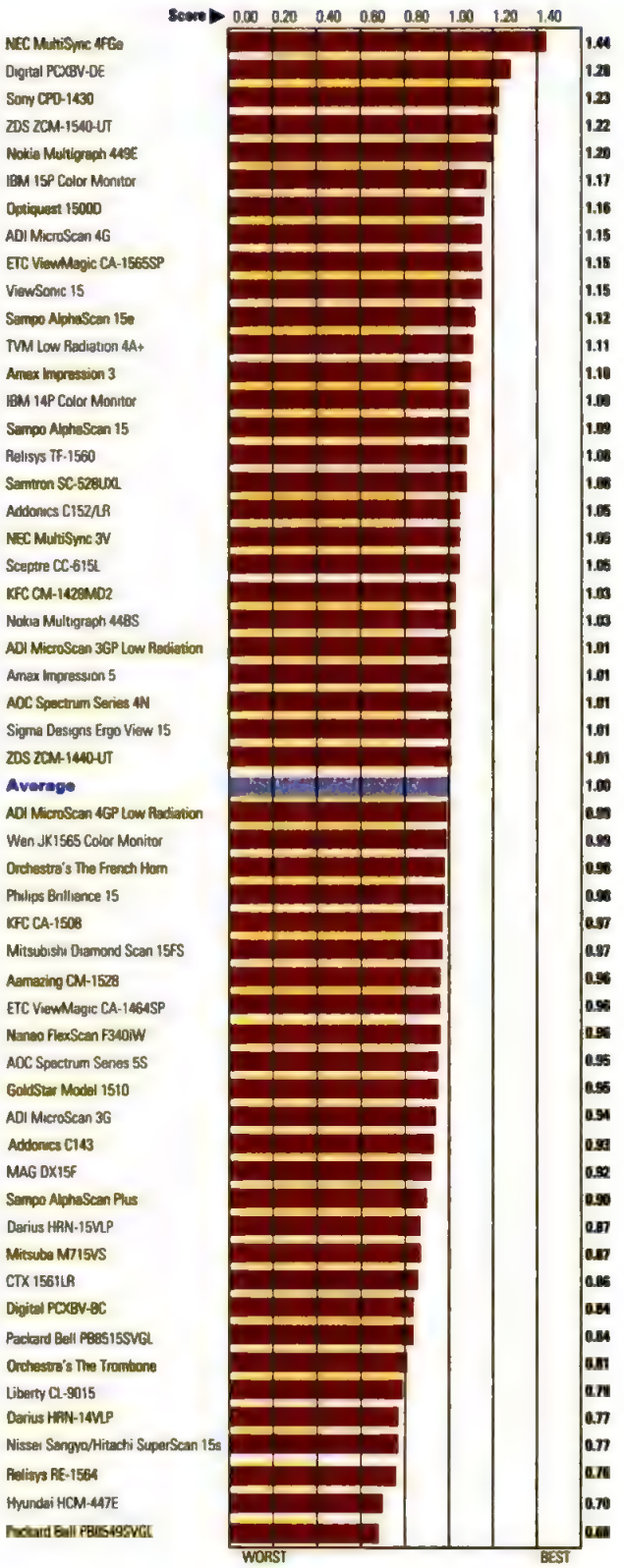
For our **RMS Misconvergence** test, we display five white horizontal lines across the screen, followed by five white vertical lines. We measure the beam displacement between red, green, and blue dots within a given line near each corner and at the center of the display. We report the root mean square of the results, or RMS misconvergence, in mils (40 mils equal 1 millimeter).

Pincushioning is a measure of how much an on-screen straight line curves or bows. Lines at the edges of the screen tend to exhibit more pincushioning than lines at the center because of the increased deflection of the electron beam. To test each monitor for vertical and horizontal pincushioning, we display a screen with three vertical lines (one at the center and one on each side of the screen), and then a screen with three horizontal lines (one at the center, one at the top of the screen, and one at the bottom). We measure the displacement at the very edges of these lines and report an overall weighted score.

Note that many of the monitors in this roundup let you adjust the vertical pincushioning. This affects the results in two ways. First, each monitor's horizontal pincushioning is almost always more severe than its vertical pincushioning. Second, because we adjust the vertical pincushioning to produce the best picture to the eye, the results are influenced by the tester's ability to determine a straight line—sensitive to approximately 0.7 mils. The SuperSpot 100 is able to measure much more precisely—to roughly 0.1 mils. It is therefore important to realize that monitors exhibiting vertical pincushioning of less than 0.7 mils have acceptable performance.

Because of a growing concern among users about the safety of prolonged exposure to magnetic field emissions, we evaluated each monitor for **Maximum ELF Emissions** and **Maximum VLF Emissions.** We used Combinova meters to measure the strength of magnetic fields at a distance of 50 cm at 16 points around the monitor (this represents a subset of the standard Swedish MPR II testing procedure). For a monitor to comply with the MPR II levels, its ELF (extremely low frequency) measurement must not exceed 200 nanoteslas, and its VLF (very low frequency) measurement must not exceed 25 nT. The numbers we report are the maximum ELF and VLF values measured around the monitor. We found that 17 of the monitors failed to meet the MPR II guideline for VLF magnetic field emissions.

COMPOSITE SCORE



ZD Labs Benchmark Tests: Mainstream Monitors

	Average MTF (percent)❶	Maximum Usable Brightness (foot-lamberts)❶	RMS Misconvergence (mils)❷	Pincushioning (mils)❷	Maximum ELF Emissions (nanoteslas)❸	Maximum VLF Emissions (nanoteslas)❹
Aamazing CM-1528	41	20.9	5.8	12.4	120	46.0
Addonics C2143	39	24.7	4.5	19.6	111	20.6
Addonics C152/LR	49	18.2	6.0	10.7	122	17.4
ADI MicroScan 3G	41	28.3	6.9	15.3	129	49.0
ADI MicroScan 3GP Low Radiation	36	26.0	3.3	16.9	110	18.2
ADI MicroScan 4G	35	28.1	3.8	8.8	135	37.0
ADI MicroScan 4GP Low Radiation	35	27.6	5.4	11.8	129	17.4
Amax Impression 3	34	19.1	7.1	6.5	110	41.0
Amax Impression 5	45	20.0	7.8	10.3	128	44.0
AOC Spectrum Series 4S	43	24.2	5.4	13.0	121	43.0
AOC Spectrum Series 5S	42	14.5	6.2	11.0	126	40.0
CTX 1581LR	39	15.0	5.8	14.8	124	13.2
Darius HRN-14VLP	31	31.2	7.7	26.7	107	12.2
Darius HRN-15VLP	30	18.0	8.7	21.9	122	15.0
Digital PCXBV-DE	33	27.0	4.7	5.9	106	15.2
Digital PCXBV-BC	37	19.0	8.5	13.9	103	12.6
ETC ViewMagic CA-1464SP	32	29.8	3.6	19.3	113	8.2
ETC ViewMagic CA-1565SP	37	21.1	3.8	8.7	122	14.0
GoldStar Model 1510	40	13.7	3.7	14.3	104	13.8
Hyundai HCM-447E	37	20.3	8.4	32.3	99	36.0
IBM 14P Color Monitor	47	20.8	4.8	10.8	106	12.6
IBM 15P Color Monitor	39	22.4	6.2	11.7	114	14.6
KFC CA-1508	52	18.0	5.3	13.6	124	15.0
KFC CM-1428MD2	32	19.6	4.3	25.9	116	12.0
Liberty CL-9015	38	19.2	8.1	18.6	112	10.6
MAG DX15F	30	22.3	4.2	13.3	121	20.4
Mitsuba M715VS	39	24.0	5.9	15.8	116	31.0
Mitsubishi Diamond Scan 15FS	44	16.8	6.5	11.2	113	14.8
Nanao FlexScan F340iW	40	26.1	5.4	14.7	122	12.6
NEC MultiSync 3V	34	29.4	4.1	11.9	104	18.2
NEC MultiSync 4FGe	48	32.8	3.8	6.6	92	11.6
Nissei Sangyo/Hitachi SuperScan 15a	28	24.0	6.8	18.4	115	21.8
Nokia Multigraph 449E	47	35.5	3.9	13.4	99	9.4
Nokia Multigraph 449S	40	25.8	5.0	16.3	102	17.4
Optiquest 1500D	40	26.4	4.1	9.4	107	17.2
Orchestra's The Trombone	38	20.1	5.6	23.9	122	49.0
Orchestra's The French Horn	41	20.6	5.9	11.8	114	42.0
Packard Bell PB8540SVGL	37	14.5	7.3	33.6	129	16.8
Packard Bell PB8515SVGL	36	15.5	6.8	13.2	86	20.0
Philips Brilliance 15	44	19.0	5.8	12.5	111	14.8
Relisys RE-1564	29	22.6	9.0	15.1	114	33.0
Relisys TF-1500	44	28.1	6.7	10.5	110	40.0
Sampo AlphaScan Plus	47	20.5	5.9	20.6	106	52.0
Sampo AlphaScan 15	38	28.2	4.2	11.1	112	55.0
Sampo AlphaScan 15e	41	22.2	6.5	7.9	112	15.2
Samtron SC-5281DL	53	23.1	4.2	16.2	133	11.8
Sceptre CC-615L	34	24.0	5.0	9.2	121	13.6
Signa Designs Ergo View 15	45	21.8	5.9	12.2	100	20.8
Sony CPD-1430	41	34.9	3.9	9.8	105	16.8
TVM Low Radiation 4A+	42	24.7	4.8	9.7	114	46.0
ViewSonic 15	40	30.1	3.8	11.0	112	14.6
Wen JK1585 Color Monitor	38	18.5	5.0	11.1	126	54.0
ZDS ZCM-1440-UT	51	22.7	4.4	20.9	97	8.8
ZDS ZCM-1540-UT	47	35.5	6.0	9.1	105	17.0

❶ Higher scores represent better performance. ❷ Lower scores represent better performance. ❸ ELF emissions may not exceed 250 nT to comply with MPR II guidelines. ❹ VLF emissions may not exceed 25 nT to comply with MPR II guidelines.

Power Conservation

For a monitor to be compliant with Energy Star power-conservation requirements, it must enter a low-power state, consuming no more than 30 watts, after a period of inactivity. A monitor can achieve this using one of two methods: by "screen blanking" or by following VESA's Display Power Management Signaling (DPMS) specification.

Screen blanking is used primarily in European countries. A standard screen saver is needed to blank the screen. Once the screen blanks out, the RGB signal to the monitor deactivates. The monitor then senses the interruption of one of the RGB signals (blue in most cases) and, as a result, cycles through a number of power-saving modes.

VESA's DPMS specification uses a different method to signal the monitor to enter power-saving modes. DPMS uses the horizontal- and vertical-synchronization lines of the monitor to activate the power-saving feature. By turning one or both signals off, the monitor enters into a low-power state or cycles through a number of power-saving modes.

As the monitor enters each new mode, increasing its power savings, it takes longer to recover when awakened by user activity. VESA defines three power-saving modes in its DPMS specifications:

- **Standby mode** saves about 30 percent of the total energy consumed by the monitor, as does screen blanking, and allows almost immediate recovery.
- **Suspend mode** increases the power savings by turning off the power used to heat some CRT components; it requires up to 5 seconds to recover.
- **Off mode** offers the maximum power savings possible (with most implementations of VESA's DPMS specifications) by supplying power to the microprocessor only.

Many of the monitors combine one or two of these modes when implementing DPMS. Of the 54 monitors we tested, 19 were Energy Star–compliant. We tested each on an ALR Flyer Green PC using its on-board video, which was capable of outputting VESA's DPMS signals. We then used a Dranetz 8000-2 Energy Analyzer to measure the power consumption of each monitor when displaying a white screen and a blank screen, both in power-saving mode.

One advantage that the screen-blanking method has over VESA's DPMS specification is that no special hardware is required to turn off the RGB signal. All you need is screen-saving software, like that included with Microsoft Windows.

The Nanao FlexScan F340iW, the two Nokia Multigraphs, and the two ZDS displays were the only monitors we tested that use the screen-blanking method to meet the Energy Star power-conservation requirements.

VESA DPMS, on the other hand, is not guaranteed to work with every PC-and-video-card combination. Although software is currently being developed to work with a number of video chip sets, many older PCs may be incapable of utilizing power savings implemented by the DPMS method.

Only 4 of the 19 Energy Star monitors failed to power down below 5 watts in their maximum power-saving mode: the MAG DX15F, the NEC MultiSync 3V, the NEC MultiSync 4FGe, and Nissei Sangyo/Hitachi's SuperScan 15s. All the other monitors had at least two power-saving modes and far exceeded the EPA's Energy Star limits on our tests.

Of the Energy Star–compliant monitors, both the NEC monitors were the largest power consumers; they used more than 20 watts each in their maximum power-saving modes.

POWER CONSERVATION (ENERGY STAR–COMPLIANT MONITORS)

Lower numbers represent greater energy effiency.

	White screen (watts)	Blank screen (watts)	Standby mode (watts)	Suspend mode (watts)	Off mode (watts)
ADI MicroScan 3GP Low Radiation	83.4	68.0	8.5	8.6	4.7
ADI MicroScan 4GP Low Radiation	78.7	60.6	6.2	6.2	4.6
AOC Spectrum Series 4N	67.7	55.0	18.8	18.8	1.8
Darius HRN-14VLP	59.0	47.9	7.0	7.0	4.5
Darius HRN-15VLP	59.0	50.8	6.4	6.4	4.5
IBM 14P Color Monitor	61.2	58.6	50.5	20.5	2.8
IBM 15P Color Monitor	70.7	56.7	48.9	20.3	2.9
KFC CA-1508	74.5	54.3	19.4	19.0	1.2
MAG DX15F	74.9	61.4	14.5	14.5	9.5
Nanao FlexScan F340iW	76.6	51.7	5.8	3.6	N/A
NEC MultiSync 3V	66.8	50.9	24.8	N/A	N/A
NEC MultiSync 4FGe	73.0	57.5	20.4	N/A	N/A
Nissei Sangyo/Hitachi SuperScan 15s	80.1	64.8	8.9	63.1	8.9
Nokia Multigraph 448S	67.3	47.8	8.2	3.5	N/A
Nokia Multigraph 449E	64.8	45.8	6.0	3.3	N/A
Optiquest 1500D	86.8	68.1	15.1	15.2	2.8
ViewSonic 15	99.0	75.8	71.0	20.4	2.3
ZDS ZCM-1440-UT	64.1	48.1	8.2	3.4	N/A
ZDS ZCM-1540-UT	64.7	48.5	6.0	3.3	N/A

N/A— Not applicable: The product does not have this feature

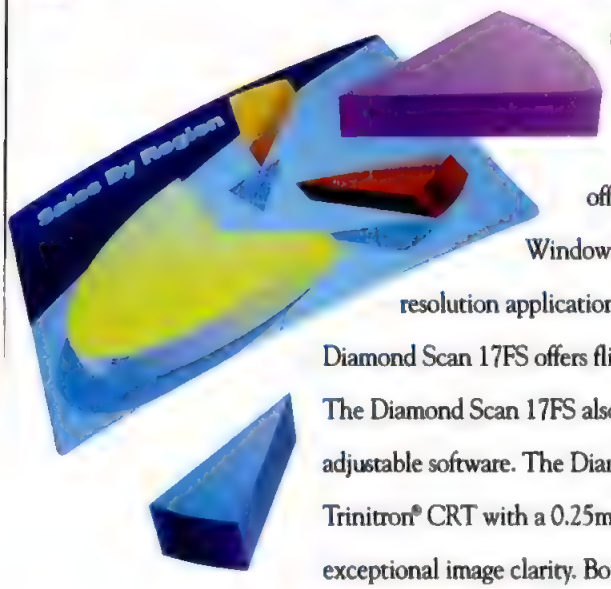
100%
50%
40
19%
59%
40%
MITSUBISHI

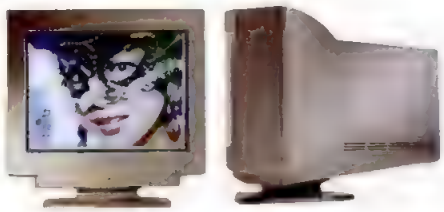
Nothing Endures Like A Diamond.

NEW MODELS

The diamond. A product of the millennia that is everlasting.

Clear, brilliant and dazzling – an appropriate reflection of the literal translation of the Mitsubishi name, which means *Three Diamonds*. Like the diamond, Mitsubishi's family of value priced Diamond Scan® and high performance Diamond Pro® color monitors are the industry benchmark for quality and longevity, as well as application versatility. ♦ All Mitsubishi monitors feature compact enclosures, high resolution and low emission designs – at an affordable price. And unlike other monitors that often fail after just one year, Mitsubishi monitors are engineered to last and are backed by a three-year warranty on parts and labor. ♦ The Diamond Pro SVGA has performance up to 1024 x 768 interlaced, while the Diamond Scan 15FS offers flicker-free 1024 x 768 non-interlaced resolutions (up to 76 Hz) for full Windows™ compatibility. ♦ For advanced Windows or Macintosh based high resolution applications requiring a larger flat square display, the Energy Star compliant Diamond Scan 17FS offers flicker free 1280 x 1024 non-interlaced resolutions (up to 74 Hz). The Diamond Scan 17FS also utilizes Mitsubishi's new optional Diamond Control™ on-screen user adjustable software. The Diamond Pro 17 offers an even larger Trinitron® CRT with a 0.25mm aperture grille producing exceptional image clarity. Both models feature the Diamond Match Color Calibration System for precise on-screen color matching. ♦ The Diamond Scan and Diamond Pro color monitors. Because nothing endures like a diamond. ♦ For more information in the U.S. or Mexico on our full line of color monitors call us at 1-800-843-2515. In Canada, call 1-800-387-9630. *For immediate product specifications call Mitsubishi Qwikfax at 1-800- 937-2094.*





Competitively Priced
Three-Year Warranty
Low Emission Design
Long-Term Durability

MSRP: DPSVGA $439; DP14 $599
MSRP: DS15FS $645; DS16 $1,169
MSRP: DS17FS $1,299; DP17 $1,499

Energy EPA POLLUTION PREVENTER

Diamond Scan 17FS

MITSUBISHI DISPLAY PRODUCTS

Mitsubishi Electronics America, Inc., Display Products, 5665 Plaza Drive, Cypress, CA 90630
Mitsubishi Electric Sales Canada, Inc., 4299 14th Avenue, Markham, Ontario L3R 0J2

© 1994 Mitsubishi Electronics America, Inc. Diamond Pro® and Diamond Scan® are registered trademarks of Mitsubishi Electronics America, Inc. Diamond Control™ is a trademark of Mitsubishi Electronics America, Inc. Trinitron is a registered trademark of Sony Corp. Windows is a trademark of Microsoft Corp. All other trademarks or registered trademarks are the property of their respective holders. Screen images produced from the following companies: Eastman Kodak Company (*Kodak Photo CD*); PCA, Inc. The Energy Star emblem does not represent EPA endorsement of any product or service (applies to Diamond Scan 17FS).

CIRCLE 280 ON READER SERVICE CARD

with a video card capable of the same (such as the ATI card we used in our tests). A vertical refresh of 72 Hz or higher almost guarantees a flicker-free screen.

MULTISCANNING

Many of the 14- and 15-inch multifrequency monitors we tested are *multiscanning* (or *multisynchronous*) as well. Multiscanning enables a monitor to adjust (or "sync") to whatever vertical and horizontal signals are being broadcast from the graphics adapter, provided those signals fall within the monitor's scanning range (bandwidth). Variable-frequency multiscanning is preferable because it supports more frequency combinations, which allows the monitor to work with more video cards and at more resolutions; multiple fixed frequency is the alternative to this.

Unfortunately, there are no Super VGA scanning standards to help set guidelines, which is another reason for buying a multiscanning monitor. Despite multiscanning's importance, not every 14- and 15- inch monitor provides such a capability, so check for this feature when evaluating models. Multiscanning is also called *autosyncing*. Of the 54 multifrequency monitors we tested, all but two offered multiscanning. The Addonics C143 and the TVM Low Radiation 4A+ offered multiple fixed frequencies.

Another feature to look for in a monitor is *autosizing*, which enables you to maintain a uniform screen size when switching between modes (for example, between an SVGA Windows 3.1 screen and a VGA DOS prompt). Without autosizing, you might have to adjust the picture manually, which is a pain if you work in different video modes, environments, and applications.

CONTROLS

Monitor controls have generally improved as more vendors have incorporated digital controls, which are driven by microprocessors. These let you more finely tune a monitor and also provide preset modes. Even analog controls (nonmicroprocessor-driven, finger-controlled wheels) have gotten better over the last year. Most of the monitors in this roundup offer digital controls for image size and position, and analog controls for contrast and brightness. We noted no significant advantage for those monitors that used digital controls for brightness and contrast.

Digital image size and position controls do offer tangible advantages, most notably the ability to provide preset and customized modes. The same vendors that offer digital brightness and contrast controls also provide digital image controls.

Another feature to consider is glare control. Antiglare treatment can improve imaging by reducing the ill effects of overhead glare, so any monitor lacking glare control as standard equipment should be looked at carefully to see if it suffers from excessive reflected room light.

Many of the monitors we tested provide some kind of antiglare treatment on the screen. Those lacking antiglare screen treatment are the Aamazing, Amax, AOC, Digital, ETC, KFC-USA, Liberty, MAG, Mitsuba, Optiquest, Packard Bell, Relisys, Samtron, TVM, and Wen units and the NEC MultiSync 4FGe, Orchestra MultiSystems' The Trombone, and both 15-inch Sampo models.

Most of the monitors in this roundup lacked external degaussing controls, which enable a monitor to be reset after magnetic interference. Those that do provide degaussing controls are the Darius HRN-15VLP, the KFC-USA models, the MAG DX15F, the Mitsuba M715VS, the Nanao FlexScan F340iW, both NEC models, the Nissei Sangyo/ Hitachi SuperScan 15s, Orchestra MultiSystems' The French Horn, the Samtron SC-528UXL, and the Sceptre CC-615L. Most other models use an automatic degausser upon startup; only two vendors in this review (Packard Bell and Sampo) have models with no degaussing capability.

MONITOR EMISSIONS

We tested all the monitors in this story for compliance with standards developed by the Swedish government's Department of Labor, using a subset of the so-called MPR II standard. This standard defines acceptable levels (amount and direction) of extremely low frequency (ELF) and very low frequency (VLF) electromagnetic radiation emitted by monitors. All of the monitors that claimed MPR II compliance passed both our ELF and VLF magnetic emissions tests.

Several monitors in this review did not claim MPR II compliance: the Aamazing CM-1528, the Addonics C143, the ADI MicroScan 3G and 4G, the Amax Impression 3 and Impression 5, the GoldStar Model 1510, the Hyundai HCM-447E, Orchestra MultiSystems' The Trombone, the Packard Bell PB8549SVGL and PB8515-SVGL, the Relisys RE-1564 and TF-1560, and the TVM Low Radiation 4A+. If potential dangers of ELF and VLF emissions concern you, you may want to think hard before buying one of these units. Many vendors that currently do not provide MPR II–compliant monitors plan to do so in the near future, so make sure to ask.

Some of these monitors offer MPR II compliance as an add-on option for an additional charge—the AOC Spectrum Series 4N and 5S ($30 extra), the Sampo AlphaScan Plus and AlphaScan 15 ($50 to 75 extra), and the Wen JK1565 Color Monitor ($20 extra).

TESTS

ZD Labs ran a comprehensive set of objective tests that are described in the "How We Tested" section of this story. In addition to our objective test suite, our reviewers worked with the 54 monitors in this roundup for a week in ZD Labs, testing each unit separately. Each reviewer followed a test script that helped to determine what it would be like to use these 14- and 15-inch multifrequency monitors every day.

We used an Extron Inline frequency meter to verify that the monitors were running at a vertical refresh rate of 72 Hz. We repeatedly jumped between full-screen DOS and Windows 3.1 to test for image defects and screen bounce.

We also ran special testing software called Montest, which allows us to inspect the monitors for convergence, pincushioning, and keystoning problems and determine to what extent the monitor's controls could correct them.

SERVICE AND RELIABILITY

Service and reliability are other factors to consider when buying a monitor. *PC Magazine* recently published a Service & Reliability survey for monitors ("Monitoring Satisfaction," January 11, 1994). Vendors were given letter grades of A, B, C, D, or E according to readers' ratings.

FAST GRAPHICS. VERY FAST GRAPHICS.

Some things in this world are fast. Very fast. Unbelievably fast. Like the Kelvin 64 advanced graphics accelerator, from Orchid Technology. The Kelvin 64 flies through Windows at speeds the likes of which have never been seen before on this earth. OS/2 soars to new, higher resolutions, while DOS utterly explodes with the speed of this new card.

Videocitis Rapidus Extraordinaire

The engine behind this incredible performance is a 64-bit graphics accelerator chip. With 64-bit access, your windows snaps open, your pixels pop instantaneously into place, even digital video streams smoothly off of your hard disk. Very smooth. Very Fast.

High-Flying Resolutions

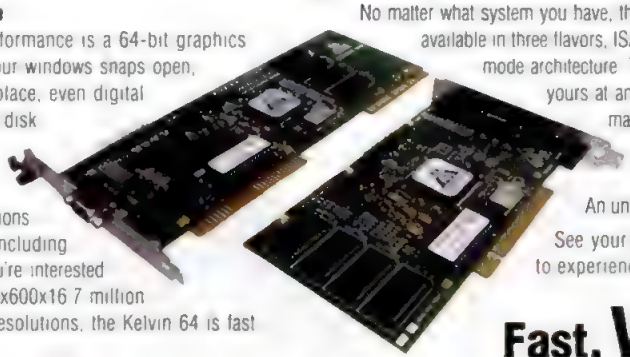
The Kelvin 64 has record-breaking resolutions too. All VESA-compliant resolutions, including ultra-high 1280x1024x256 colors. If you're interested in color space, experience Kelvin's 800x600x16.7 million color resolutions. Even at these high resolutions, the Kelvin 64 is fast. Incredibly Fast.

Easy To Install

And you won't have to be a rocket scientist to install the Kelvin 64. Switchless installation and friendly utility software will get you up and running Fast. Very Fast.

ISA, VLB and PCI compatible!

No matter what system you have, there's a Kelvin 64 for you. Kelvin is available in three flavors, ISA, VL-Bus or the new PCI bus burst mode architecture. This incredible performance can be yours at an unbelievably low price that would make any defense contractor blush.



The Orchid Kelvin 64.
A fast graphics accelerator.
An unbelievably fast graphics accelerator.

See your dealer or call 1-800-7-ORCHID to experience the speed.

Fast. Very Fast.

ORCHID **KELVIN 64**

Kelvin 64 is a trademark of Orchid Technology. Suggested retail price is $250.

ORCHID TECHNOLOGY. 45365 Northport Loop West. Fremont, CA 94538. Tel : 1-800-7-ORCHID

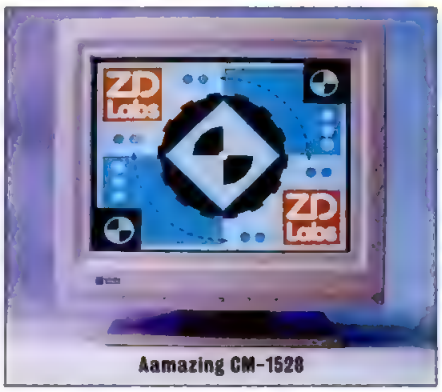
CIRCLE 350 ON READER SERVICE CARD

Aamazing Technologies Corp.

Aamazing CM-1528

BY DON CRABB

The $694 15-inch Aamazing CM-1528, from Aamazing Technologies Corp., is a variable-frequency monitor with analog controls for image adjustment. Although the unit's overall performance was acceptable, its list price keeps it from being one of the more competitive 15-inch monitors in this roundup.



Aamazing CM-1528

The CM-1528 uses a 15-inch Hitachi flat-square tube. The monitor has a 13.8-inch active screen size and a 0.28-mm dot pitch, which is standard for 14- and 15-inch monitors. The 30-pound unit comes complete with an adapter cable that supports miniDB-15 connections on both ends.

The CM-1528's display can handle a maximum 1,280-by-1,024 noninterlaced resolution at a 60-Hz vertical refresh rate. At the more reasonable 1,024-by-780 resolution, the monitor's refresh rate rises to 72 Hz, which helps keep the displayed image flicker-free for most viewers.

During our objective tests, the CM-1528 proved its mettle as a solid monitor with a good though not superb image. In SuperSpot 100 testing, the Aamazing CM-1528 turned in a decent pincushioning score (12.4 mils), which placed it among the upper half of the tested units.

The CM-1528's composite score placed it seven monitors below the average of all tested units. That performance is not terrible, but there were a number of less expensive 15-inch monitors that had better results on our tests.

In subjective testing, no serious pincushioning was observed, but we did note a number of image defects, including serious moiré patterns, and an overall grainy image with underlying grays that further muddied things under Microsoft Windows. The CM-1528 also suffered from measured and observed misconvergence at the corners of the monitor's displayed image.

The CM-1528 does not comply with MPR II emissions standards. Also, the monitor is not equipped to support VESA's DPMS specification and doesn't meet the FDA's Energy Star requirements.

The CM-1528 has analog adjustment controls for image positioning and sizing, but you'll miss having controls for pincushioning, barrel distortion, and misconvergence. The manual provided with the monitor left much to be desired, offering almost no detail about the operation of the Aamazing CM-1528.

Overall, the Aamazing CM-1528 is a 15-inch monitor with perfectly usable SVGA and 1,024-by-768 resolutions at mostly flicker-free refresh rates around 72 Hz. However, the monitor's somewhat high list price, coupled with decent though unspectacular test results, keeps the Aamazing CM-1528 from being one of the more competitive monitors in our roundup.

Addonics, a division of Fora International Corp.

Addonics C143
Addonics C152/LR

BY ALFRED POOR

Addonics, which is a division of Fora International Corp., has two entries in this roundup, the $320 14-inch Addonics C143 and the $470 15-inch Addonics C152/LR. Both monitors are among the lowest-priced units in their respective classes, and despite some significant limitations, both monitors are worth serious consideration if low price is a major deciding factor.

Addonics C152/LR

The Addonics C143 uses a conventional 14-inch tube (as opposed to a flat-square design). The monitor can only handle 1,024-by-768 resolution at a 60-Hz vertical refresh rate, though it can manage 800-by-600 at 72 Hz.

In terms of objective test results, the Addonics C143 earned mixed results. It was better than average on the misconvergence test but much worse than average on the pincushioning test. Subjectively, the Addonics C143's images were sharp, with horizontal and vertical lines that were of equal thickness and brightness. The monitor manages to switch from high-resolution graphics to VGA with a minimum amount of bounce, and the switch back is solid and smooth. The biggest problem is that you may have to resize the image when changing resolutions, even when using VESA-compatible signals.

In short, the Addonics C143 is not the best monitor in our test group, but its lower price is sufficient compensation for its less than optimal performance. If you're looking for an affordable monitor with basic features, the Addonics C143 makes a good budget choice.

The Addonics C152/LR has a 15-inch flat-square tube and digital controls. The monitor can handle up to 1,024-by-768 resolution at 72 Hz. The Addonics C152/LR had mixed results on our tests. Its misconvergence measurement was slightly worse than average, and errors in its image registration were clearly noticeable. On the other hand, the unit's pincushioning measurement was significantly better than average. The image scrambles when the monitor switches from high resolutions to VGA but is still acceptable. The Addonics C152/LR is limited in terms of its brightest setting: It may not be bright enough for work areas with high light levels.

The Addonics C152/LR has digital controls conveniently arranged along the lower edge of the case. One rocker button lets you select the setting mode (size, position, or pincushioning), and a second lets you increase or decrease the setting. Even the brightness and contrast controls

are digital. The Addonics C152/LR does not meet MPR II emissions standards, nor does it comply with Energy Star power-conservation requirements.

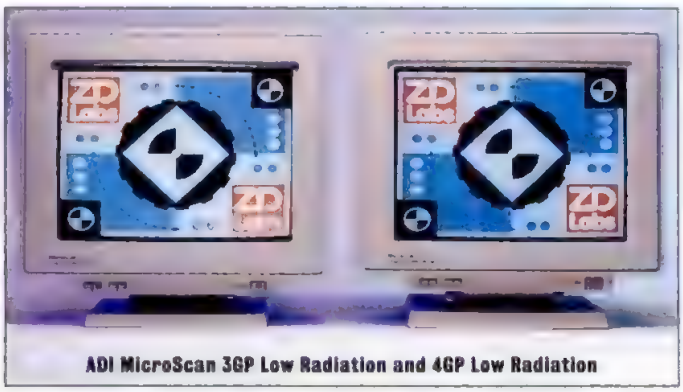
While it does not have the best image quality in its group, the digital features and the low price make the Addonics C152/LR a competitive choice if you're looking for a bargain 15-inch monitor.

ADI Systems Inc.

ADI MicroScan 3G
ADI MicroScan 3GP Low Radiation
ADI MicroScan 4G
ADI MicroScan 4GP Low Radiation

BY JOHN R. QUAIN

ADI Systems' quartet of 14- and 15-inch MicroScan monitors offers reasonable performance at reasonable prices. All four of the monitors reviewed here have a full array of digital controls and generally above-average performance, the only exception being the slightly out-of-tune ADI MicroScan 3G.



ADI MicroScan 3GP Low Radiation and 4GP Low Radiation

ADI's two 14-inch monitors—the $395 ADI MicroScan 3G and the $410 ADI MicroScan 3GP Low Radiation—are based on conventional curved tubes with a 0.28-mm dot pitch and a maximum noninterlaced resolution of 1,280-by-1,024 at a 60-Hz vertical refresh rate. Both models come with digital controls for brightness and contrast.

The 14-inch MicroScan 3GP conforms to the MPR II low emissions specifications and complies with the Energy Star and VESA DPMS standards. In power-saving mode, the monitor's front-panel LED changes from green to orange to indicate that the system is in power-saving mode. In tests, it reduced power consumption from 83.4 to 8.6 watts in Suspend mode, well below the 30-watt-maximum Energy Star requirement.

Super VGA image performance of the MicroScan 3GP was fair to excellent. The pincushioning result was worse than average, and some geometric distortion was apparent in subjective evaluations. Convergence, however, was top-notch—as evidenced by the MicroScan 3GP's first-place score on our misconvergence test—and the monitor was generally well behaved, switching between video modes by blanking the screen and quickly fading into the next resolution.

The less expensive 14-inch MicroScan 3G does not conform to the low-emission MPR II rating and is not Energy Star–compliant. It was the only below-average ADI performer.

The MicroScan 3G's primary image flaw proved to be an unacceptable amount of misconvergence, which we detected in both subjective evaluations and objective testing. Furthermore, this monitor proved to be more vulnerable to moiré patterns. Lackluster performance on 1,024-by-768 tests also revealed that displaying high-resolution graphics is not the MicroScan 3G's forte.

ADI's two 15-inch monitors—the $475 ADI MicroScan 4G and the $490 ADI MicroScan 4GP Low Radiation—use more pleasing 0.28-mm dot-pitch flat-square tubes that also support a 60-Hz 1,280-by-1,024 maximum noninterlaced resolution. Both 15-inch ADI monitors come with the same array of digital controls as the smaller 14-inch models.

The higher price tag on the MicroScan 4GP means you get MPR II and Energy Star compliance. On our tests, the MicroScan 4GP reduced power consumption from 78.7 to 6.2 watts in the monitor's DPMS-specified Suspend mode.

Most users should also be pleased with the SVGA image performance of both 15-inch ADI monitors. A bright image and respectable sharpness characterize both models. Pincushioning and misconvergence test results were better than average. And both of these 15-inch models handled video mode switching with the same aplomb as the 14-inch ADI offerings.

One complaint we do have with the MicroScan 4G and 4GP is that the antiglare coating could be more effective. In addition, these monitors could use a degaussing button to alleviate some of the magnetic interference buildup we noticed. And although neither unit had a problem reaching its maximum 1,280-by-1,024 resolution, neither model favored this higher mode.

If you're interested in the ADI line, we recommend you pay the additional $15 for one of the low-emission, power-saving models.

Amax Engineering Corp.

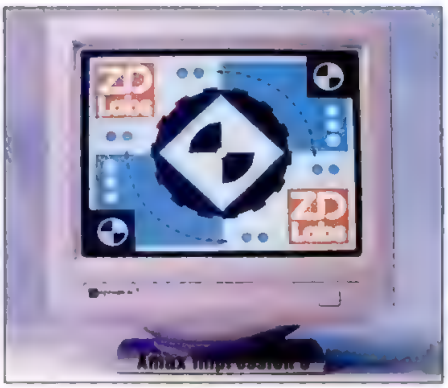
Amax Impression 3
Amax Impression 5

BY DON CRABB

Amax Engineering Corp.'s 14-inch Amax Impression 3 ($299 list) and 15-inch Amax Impression 5 ($399 list) are multifrequency autosyncing monitors. Both monitors offer decent performance at bargain prices.

The Impression 3 uses a 14-inch Matsushita tube that has a 13-inch active screen size. During our tests, the monitor provided a good image with a few noticeable defects.

In SuperSpot 100 testing, the Impression 3 placed among the very worst on our



modulation transfer function and misconvergence tests. Also close to the bottom was the monitor's maximum usable brightness measurement. However, the monitor did have the second-best pincushioning test score of all tested monitors (6.5 mils). Only the Digital PCXBV-DE had a better pincushioning result.

During subjective testing, we didn't notice any pincushioning, but we were able to see serious misconvergence. Despite the Impression 3's poor objective test results, its exceptional performance on our pincushioning test helped place its composite score in the upper quarter of our test group.

The Impression 3's shadow-mask display would not support a resolution of 1,280-by-1,024 at a 60-Hz scan rate. At the more reasonable 1,024-by-780 resolution, though, the monitor produced a good image with a refresh rate of 70 Hz.

The Impression 3 includes pincushioning, color, and keystone controls, which are nice pluses. Like most of the monitors we tested, however, the Impression 3 lacks convergence controls.

The Amax Impression 5, which has a 13.9-inch active screen size, also provided a good image with a few noticeable defects. On our objective tests, the Impression 5 had an average composite score, and its modulation transfer function test result was in the top third of all monitors. Like the Impression 3, the Impression 5 had one of the worst misconvergence scores, yet it checked in as the twelfth-best monitor on our pincushioning test.

During subjective testing, we did see some pincushioning, although it was not severe. We also noted misconvergence even without using our special testing software, making us wonder whether our test unit was misaligned at the factory.

Unlike the Impression 3, the Impression 5 shadow mask display supported a resolution of 1,280-by-1,024 at 60 Hz. It handled a 1,024-by-780 resolution nicely, producing an image with a refresh rate of 70 Hz. The Impression 5, like its smaller sibling, includes pincushioning, color, and keystone controls and lacks convergence controls.

Although the Impression 3 and Impression 5 have serious convergence errors, both still offer acceptable overall performance given their bargain-basement prices.

AOC International (USA) Ltd.

AOC Spectrum Series 4N
AOC Spectrum Series 5S

BY BRUCE BROWN

AOC International (USA)'s $359 14-inch AOC Spectrum Series 4N and $499 15-inch AOC Spectrum Series 5S are both aggressively priced for their respective classes. The 14-inch Spectrum 4N is the better buy, however, based on tested and observed performance.

The Spectrum 4N, which outperformed the Spectrum 5S, uses a 14-inch Chung Hwa or Hitachi curved tube (depending on availability) with a 13.3-inch active screen size. The Spectrum 4N supports the VESA standard 72-Hz vertical refresh rate at 800-by-600 resolution, but at its maximum 1,024-by-768 resolution, the monitor can maintain only an acceptable but not optimal 60 Hz. This monitor cannot support a resolution of 1,280-by-1,024 at any refresh rate.

The Spectrum 4N had better-than-average modulation transfer function and pincushioning scores. Also average were the monitor's brightness and misconvergence numbers. No misconvergence or pincushioning was visible during subjective testing.

The Spectrum 4N is a variable-frequency monitor. It has no microprocessor and doesn't autosize, but its analog user controls include a convenient pincushioning adjustment.

The Spectrum 5S's objective and subjective scores were disappointing. The unit uses either a Hitachi or NEC flat-square 15-inch tube (depending on availability), with a 13.5-inch active screen size.

The Spectrum 5S provides a steady image at a resolution of 1,024-by-768 and a 75-Hz vertical refresh rate. The monitor was also able to run at a refresh rate of 60 Hz at its maximum resolution of 1,280-by-1,024.

The Spectrum 5S had an above-average modulation transfer function score, and its performance on our pincushioning test was also better than average, at 11 mils. The Spectrum 5S, however, had a poor misconvergence score (6.2 mils), and the monitor's maximum usable brightness score was very low (tied for second-worst in our roundup). The Spectrum 5S's composite score was also below the average.

Currently, only the Spectrum 4N is Energy Star–compliant, but according to AOC, a version of the Spectrum 5S that does meet Energy Star standards will be available soon. For an additional $30, MPR II–compliant versions are available for both the Spectrum 4N and the Spectrum 5S.

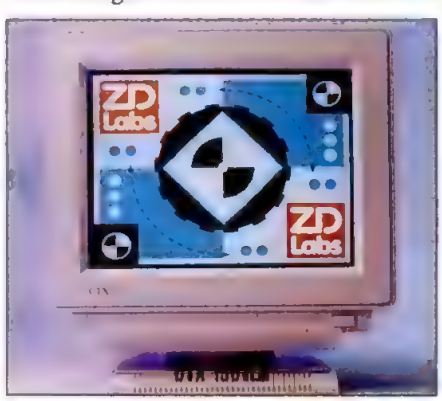
Neither of these AOC monitors is outstanding. But the lower-priced Spectrum 4N is acceptable for general duty and proved itself to be a better performer than the more expensive 15-inch Spectrum 5S.

CTX International Inc.

CTX 1561LR

BY BRUCE BROWN

The $599 15-inch CTX 1561LR, from CTX International, falls short of its competition both on our objective tests and in our subjective evaluations. The CTX 1561LR uses a flat-square 15-inch tube from NEC Technologies with a 14-inch active screen area. The monitor can maintain a 72-Hz vertical refresh rate at its maximum 1,024-by-768 resolution. At a lower 800-by-600 resolution, the CTX 1561LR can run at 76 Hz, which is higher than the 70- or 72-Hz verti-



MICRON PENTIUM™

$2799

MICRON
SEMICONDUCTORS TO SYSTEMS

15 YEARS STRONG

PENTIUMS FOR

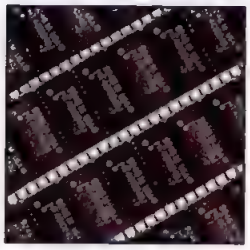
P60PCI VALUELINE CD

- Intel™ Pentium™ 60MHz Processor
- 8MB RAM upgradeable to 128MB
- 340MB 14ms IDE hard drive
- PCI 32-bit IDE hard drive controller
- 256K 15ns write-back cache
- 1MB Flash BIOS by Phoenix
- 4 ISA, 2 PCI, 1 ISA/PCI slots
- 2X CD-ROM drive, 3.5" floppy drive
- PCI graphics accelerator (2MB RAM)
- 14" Micron 14FG, 1024NI, .28mm, MPRII
- 2 on-board 16550-compatible serial ports
- 1 on-board bi-directional parallel port
- Desktop "Tool Free" chassis, 3 cooling fans
- Microsoft® Mouse, 101-key keyboard
- MS-DOS & Windows® for Workgroups
- Choice of application software

$2,799

66MHz PENTIUMS NOW AVAILABLE!

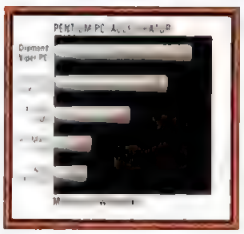
MICRON MEANS MORE MEMORY



Over the past 15 years Micron has gained worldwide recognition as a leading memory manufacturer. Now Micron offers you memory upgrades for your existing PCs -- at factory-direct prices.

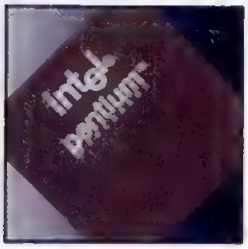
Call Micron today for factory-direct savings!

DIAMOND VIPER ACCELERATOR



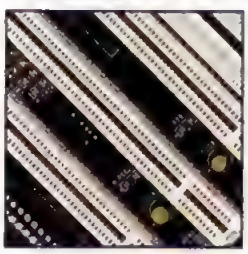
Powered by the Weitek P9000, the Diamond Viper PCI runs at almost twice the speed of the ATI PCI graphic accelerator. With 2MB of VRAM, you'll get 256 colors at 1280 x 1024 @ 75Hz and 16.7 million colors at 800 x 600. Turbo Windows and SoftEngine AutoCAD drivers included.

PENTIUMS FOR POWER USERS



Intel's new Pentium™ microprocessor is a power user's dream! Its 64-bit data path and superscalar operation give you consistently superior performance, whether your system is designed as a network server or a workstation.

MICRON PCI SUB-SYSTEMS



- PCI Local Bus IDE controller
- PCI Local Bus IDE caching controller with 4MB standard (upgradeable to 16MB)
- PCI Local Bus Fast SCSI-2 controller

POWER USERS

P60PCI PLATINUM CD

- Intel Pentium 60MHz Processor
- 64MB RAM, upgradeable to 128MB
- 2.0GB 9ms SCSI-2 hard drive
- PCI Fast SCSI-2 controller
- 256K 15ns write-back cache
- 1MB Flash BIOS by Phoenix
- 4 ISA, 2 PCI, 1 ISA/PCI slots
- 2X CD-ROM drive, 3.5" floppy drive
- Diamond Viper PCI (2MB VRAM)
- 17" Micron 17FQx, 1280NI, .28mm, MPRII
- 2 on-board 16550-compatible serial ports
- 1 on-board bi-directional parallel port
- Tower: 10 drive bays, 3 cooling fans
- Microsoft Mouse, 101-key keyboard
- MS-DOS & Windows for Workgroups
- Choice of application software

$6,799 [illegible]

PC WORLD EDITORS' CHOICE

PC WORLD BEST BUY

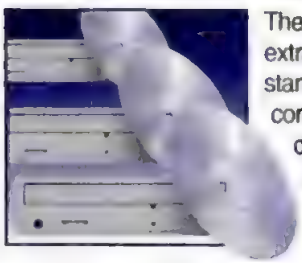
4 YEAR ON-SITE WARRANTY

Protect your new Micron system with one of the most respected names in America – General Electric! This new optional four-year warranty provides on-site service, parts and labor on your entire system, including the monitor. Ask your Micron representative for details.

MICRON COMPUTER, INC.

800-388-6334

2X CD-ROM DRIVE STANDARD

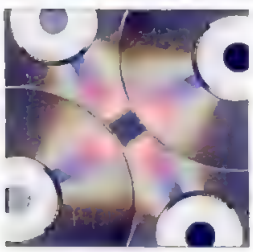


The competition makes you pay extra for what Micron includes as standard equipment. Our MPC-2 compliant, double-speed, caddyless drive supports multisession Kodak photo CDs and plays all standard audio CDs.

MICRON MEANS COMPATIBILITY

Micron Pentium and 486 systems are designed in cooperation with leading software manufacturers to achieve compatibility with all major operating systems, including Windows NT™, Windows for Workgroups, IBM OS/2™, and Novell® network products.

SOFTWARE LIBRARY ON CD-ROM



Try out top titles before you buy! Dozens of programs from leading publishers, including Microsoft, Borland, Lotus, Sierra On-Line, Broderbund and more. Just call Softbank's toll-free number and order. They'll help you download the program right from your CD-ROM.

CHOOSE ONE AT NO CHARGE... GET ALL 4 FOR $199*

- WordPerfect for Windows
- WordPerfect Presentations for Windows
- Paradox for Windows Workgroup Edition
- Quattro Pro for Windows Workgroup Edition

*WITH SYSTEM PURCHASE ONLY. NOT AVAILABLE ON 425VL VALUELINE SYSTEMS.

CD-ROM DRIVE
AND MORE MEMORY THAN EVER

P60PCI BESTBUY CD

- Intel Pentium 60MHz Processor
- 16MB RAM, 527MB 10ms IDE HD
- PCI 32-bit IDE hard drive controller
- 256K 15ns write-back cache, Flash BIOS
- 4 ISA, 2 PCI, 1 ISA/PCI slots
- 2X CD-ROM drive, 3.5" floppy drive
- Diamond Viper PCI (2MB VRAM)
- 15" Micron 15FG, 1280NI, .28mm, MPRII
- Desktop "Tool Free" chassis, 3 fans
- Microsoft Mouse, 101-key keyboard
- MS-DOS & Windows for Workgroups
- Choice of application software

$3,599 LEASE - $125/MO.

P60PCI MAGNUM CD

- Intel Pentium 60MHz Processor
- 16MB RAM, 527MB 10ms SCSI-2 HD
- PCI 32-bit Fast SCSI-2 controller
- 256K 15ns write-back cache, Flash BIOS
- 4 ISA, 2 PCI, 1 ISA/PCI slots
- 2X CD-ROM drive, 3.5" floppy drive
- Diamond Viper PCI (2MB VRAM)
- 15" Micron 15FG, 1280NI, .28mm, MPRII
- Tower: 10 drive bays, 3 cooling fans
- Microsoft Mouse, 101-key keyboard
- MS-DOS & Windows for Workgroups
- Choice of application software

$3,799 LEASE - $132/MO.

P60PCI POWERSTATION CD

- Intel Pentium 60MHz Processor
- 16MB RAM, 527MB 10ms IDE HD
- PCI IDE caching controller w/4MB RAM
- 256K 15ns write-back cache, Flash BIOS
- 4 ISA, 2 PCI, 1 ISA/PCI slots
- 2X CD-ROM drive, 3.5" floppy drive
- Diamond Viper PCI (2MB VRAM)
- 15" Micron 15FG, 1280NI, .28mm, MPRII
- Desktop "Tool Free" chassis, 3 fans
- Microsoft Mouse, 101-key keyboard
- MS-DOS & Windows for Workgroups
- Choice of application software

$3,899 LEASE - $136/MO.

466VL MAGNUM MPC

- Intel 486DX2 66MHz processor
- Pentium Technology Ready (ZIF)
- 8MB RAM, 245MB 14ms VLB IDE HD
- 256K 15ns write-back cache, Flash BIOS
- 16-Bit CD quality sound card
- 2X SCSI-2 CD-ROM drive, dual floppy
- Diamond Viper VLB (1MB VRAM)
- 15" Micron 15FG, 1280NI, .28mm, MPRII
- Desktop "Tool Free" chassis
- Microsoft Mouse, 101-key keyboard
- MS-DOS & Windows for Workgroups
- Choice of application software

$2,699 LEASE - $98/MO.

466VLE WINDSERVER CD

- Intel 486DX2 66MHz processor
- Pentium Technology Ready (ZIF)
- 16MB RAM, 527MB 10ms SCSI-2 HD
- 256K 15ns cache (to 512K), Flash BIOS
- 8 expansion slots: 2 VESA, 8 EISA
- 2X CD-ROM drive, 3.5" floppy
- Diamond Viper VLB (2MB VRAM)
- 15" Micron 15FG, 1280NI, .28mm, MPRII
- Tower chassis with 7 drive bays
- Microsoft Mouse, 101-key keyboard
- MS-DOS & Windows for Workgroups
- Choice of application software

$3,599 LEASE - $125/MO.

466VLE MAGSERVER CD

- Intel 486DX2 66MHz processor
- Pentium Technology Ready (ZIF)
- 16MB RAM, 1.0GB 10ms SCSI-2 HD
- 256K 15ns cache (to 512K), Flash BIOS
- 8 expansion slots: 2 VESA, 8 EISA
- 2X CD-ROM drive, 3.5" floppy drive
- Diamond SpeedStar Pro VLB (1MB)
- 14" Micron 14FG, 1024NI, .28mm, MPRII
- Tower chassis with 7 drive bays
- Microsoft Mouse, 101-key keyboard
- MS-DOS & Windows for Workgroups
- Choice of application software

$3,799 LEASE - $132/MO.

425VL VALUELINE CD

- Intel™ 486SX 25MHz processor
- Pentium™ Technology Ready (ZIF)
- 4MB RAM, 245MB 14ms IDE HD
- Upgradeable cache (to 256K)
- 6 expansion slots: 2 VESA, 6 ISA
- 280ms 1X CD-ROM drive, 3.5" floppy
- Diamond SpeedStar Pro VLB (1MB)
- 14" Micron 14FG, 1024NI, .28mm, MPRII
- Desktop "Tool Free" chassis
- Microsoft Mouse, 101-key keyboard
- MS-DOS® & Windows™ for Workgroups

$1,399 LEASE - $51/MO.

433VL MAGNUM CD

- Intel 486DX 33MHz processor
- Pentium Technology Ready (ZIF)
- 8MB RAM, 340MB 14ms VLB IDE HD
- 256K 15ns write-back cache, Flash BIOS
- 7 expansion slots: 2 VESA, 7 ISA
- 2X CD-ROM drive, 3.5" floppy
- Diamond SpeedStar Pro VLB (1MB)
- 14" Micron 14FG, 1024NI, .28mm, MPRII
- Desktop "Tool Free" chassis
- Microsoft Mouse, 101-key keyboard
- MS-DOS & Windows for Workgroups
- Choice of application software

$1,999 DX2 50MHz - ADD $50
DX2 66MHz - ADD $200

466VL WINDSTATION CD

- Intel 486DX2 66MHz processor
- Pentium Technology Ready (ZIF)
- 16MB RAM, 340MB 14ms VLB IDE HD
- 256K 15ns write-back cache, Flash BIOS
- 7 expansion slots: 2 VESA, 7 ISA
- 2X CD-ROM drive, 3.5" floppy drive
- Diamond Viper VLB (2MB VRAM)
- 15" Micron 15FG, 1280NI, .28mm, MPRII
- Desktop "Tool Free" chassis
- Microsoft Mouse, 101-key keyboard
- MS-DOS & Windows for Workgroups
- Choice of application software

$2,799 LEASE - $102/MO.

MICRON
COMPUTER, INC.
800-388-6334

intel inside

- NEXT DAY SHIPPING ON MOST SYSTEMS
- 30 DAY RISK-FREE MONEY BACK GUARANTEE
- ONE YEAR EXPRESS PARTS REPLACEMENT
- LIFETIME TOLL-FREE TECHNICAL SUPPORT
- ON-SITE SERVICE OR SYSTEM REPLACEMENT

intel inside pentium

CIRCLE 119 ON READER SERVICE CARD

MON-FRI 7AM - 8PM, SAT 8AM - 5PM(MST) • 915 E. Karcher Road • Nampa, Idaho 83687 • (208) 465-3434 • FAX (208) 465-3424

©1993 Micron Computer, Inc. All rights reserved. All prices and specifications subject to change without notice. Micron Computer, Inc. cannot be responsible for misprints, errors in typography or photography. Intel, Intel Inside, Pentium and Overdrive are registered trademarks of Intel Corporation. Microsoft is a registered trademark and Windows, Windows NT and the Windows logo are trademarks of Microsoft Corporation. The Energy Star emblem does not represent EPA endorsement of any product or service. All other company trademarks are trade names of each respective company. Prices do not include shipping or handling. 30 day no-hassle money back guarantee does not include return freight or shipping and handling charges. Applies only to Micron brand products, and begins from date of shipment. All returns require RMA numbers and must be shipped in the original container intact and insured.

cal refresh rate typically required for flicker-free viewing.

The CTX 1561LR's performance on our objective tests was less than impressive. The monitor's best scores were slightly worse than average—on our pincushioning test (14.6 mils) and our misconvergence test (5.8 mils). Also below the average was the unit's modulation transfer function score.

The rest of the CTX 1561LR's objective test results were much worse. The monitor's score of 15 foot-lamberts on our maximum usable brightness test was the fourth-worst in our test group. Only the AOC Spectrum Series 5S, GoldStar Model 1510, and Packard Bell PB8549SVGL garnered poorer numbers on the brightness test.

The combination of the CTX 1561-LR's poorer-than-average performances on all our objective tests earned it a composite score that was only tenth from the bottom.

Our subject evaluations found that there was no muddiness between text characters and very little screen glare on the CTX 1561LR. Also, pincushioning was not a problem with the monitor, but otherwise this unit's observed and tested performance was below par.

The CTX 1561LR had readily noticeable misconvergence problems, which confirmed our objective test result. Also, there was significant screen bounce in regulation testing, notably apparent in text-to-graphics mode switching and when switching between full and partial DOS windows. Switching between full and partial DOS windows was also accompanied by an audible double click.

The variable-frequency CTX 1561LR is nonmicroprocessor-controlled and has analog image-adjustment controls. These controls are limited to the usual variety of brightness, contrast, and positioning dials, with no pincushioning, trapezoidal adjustment, or color matching provided.

The CTX 1561LR meets the MPR II low-emissions guidelines, but it does not support VESA's DPMS signaling standard or comply with Energy Star power-conservation requirements.

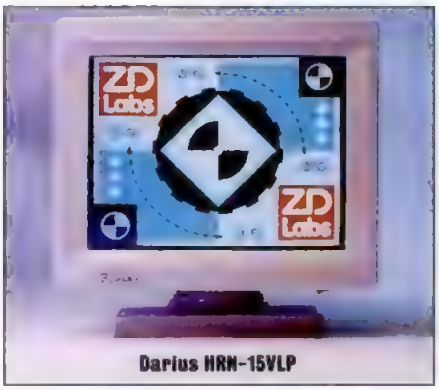
In sum, the 15-inch CTX 1561LR is a less than impressive display that failed to distinguish itself from our test group.

Darius Technology Ltd.

Darius HRN-14VLP
Darius HRN-15VLP

BY ALFRED POOR

In terms of basic features, the 14-inch Darius HRN-14VLP ($399 list) and the 15-inch Darius HRN-15VLP ($495 list), from Darius Technology, are nearly identical. Also, both monitors are aggressively priced, and if their image quality were better, they would be attractive values.



Darius HRN-15VLP

The HRN-14VLP is among the least expensive of all tested monitors. It uses a 14-inch conventional tube with a 13.4-inch active screen size, and can handle VESA-standard signals for resolutions of up to 1,024-by-768 at 70 Hz and 800-by-600 at 72 Hz.

The biggest problem with the HRN-14VLP was its image quality. Although the monitor had the fifth-highest maximum usable brightness score, it turned in some of the worst measurements of the entire test group on the rest of our objective tests. The HRN-14VLP's score on our pincushioning test was especially bad; only the Hyundai HCM-447E and the Packard Bell PB8549SVGL had worse results.

The HRN-15VLP uses a 15-inch flat-square tube with an active screen size of 13.75 inches, and like its smaller sibling, it is capable of handling signals up to the VESA standards of 1,024-by-768 resolution at 70 Hz and 800-by-600 at 72 Hz. Unfortunately, the HRN-15VLP also shares another feature with its stablemate: poor picture quality.

On our objective tests, the HRN-15VLP's misconvergence and pincushioning results were among the worst of our test group. In addition, it was very limited in its brightness range, with the sixth-worst maximum usable brightness score. Most users will find that they need to run the HRN-15VLP at its full brightness level in a typical office environment. During subjective examination, we found the HRN-15VLP's image was noticeably fuzzy, especially away from the very center of the screen.

The HRN-14VLP and the HRN-15VLP are MPR II–compliant, and both are compatible with VESA's DPMS signaling specification for power saving—qualifying them for the EPA's Energy Star status.

Aside from their MPR II ratings and energy-saving features, the Darius monitors have no additional outstanding features. Both rely on analog image-adjustment controls (including pincushioning) and have a single-digit display that indicates the monitor's current display mode. Although this is somewhat useful, it's not as informative as some other displays. The user manual that comes with each monitor is thin but contains most of the information you would need.

Unfortunately, despite being equipped with the basic number of features and being competitively priced, the poor image quality of the Darius HRN-14VLP and the Darius HRN-15VLP leaves both monitors near the bottom of the stack.

Digital Equipment Corp.

Digital PCXBV-DE
Digital PCXBV-BC

BY JOHN R. QUAIN

A year ago, these two mainstream monitors from Digital Equipment Corp., the $399 14-inch Digital PCXBV-DE and the $499 15-inch Digital PCXBV-BC, would have compared well enough with the leading monitors in their respective classes. Unfortunately, neither of these monitors is compliant with Energy Star power-saving specifications or offers digital controls—now considered standard features for leading monitors.

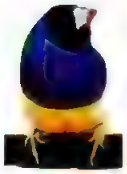
The PCXBV-DE is a no-frills unit with a 0.28-mm dot pitch and a maximum resolution of 1,024 by 768 pixels at a 72-Hz vertical refresh rate. It has only basic analog image-adjustment dials and no pincushioning or color controls, but it is MPR II–compliant.

The PCXBV-DE, based on a standard

"One Monitor Can Do It All"

BEST COLOR QUALITY: VIEWSONIC 17

"The ViewSonic 17 combines wide, smooth color range, excellent saturation and intensity, and superb uniformity for a picture-perfect image."



BEST SHARPNESS: VIEWSONIC 17

"Whether you work with text or drawings, the ViewSonic 17 will provide you with the sharpest display, even at the edges of the screen."

BEST VERSATILITY: VIEWSONIC 17

"Along with the richest colors and sharpest text and images, the ViewSonic 17 rates high in usability, thanks in part to its intuitive image controls."

BEST OVERALL: VIEWSONIC 17

"Best color quality, best sharpness and best versatility – what more could we ask of the ViewSonic 17? Frankly, we were surprised that one monitor could do it all."

(PC Computing/January 1994)

PCComputing USABILITY

Which monitor can do it all? The ViewSonic 17! In a recent review of 13 monitors (including NEC, Nanao, Mitsubishi, and Sony), PC Computing wrote, "Frankly, we were surprised that one monitor could do it all – but our surprise will be a pleasant reward for your eyes and your budget."

Advancing into the future, our 17-inch New Generation monitor offers a flat square screen, ViewMatch color control, double dynamic focus gun, Advanced Invar Shadow Mask and a maximum resolution up to 1,600 x 1,280. And those are just some of the features that make this the monitor of choice.

To see the "Best" monitor, go to your nearest dealer and check out the ViewSonic 17. Then you'll know why it's the monitor that can do it all.

ViewSonic®

See The Difference!™

20480 Business Parkway, Walnut, CA 91789
Phone: **(800) 888-8583** • (909) 869-7976
Fax (909) 869-7958

All products and trademarks are brand names of their respective companies.

CIRCLE 118 ON READER SERVICE CARD

14-inch curved tube, had one of the best 800-by-600 displays of any monitor in this roundup. Lines displayed on the monitor were ruler-straight, resulting in the best pincushioning score of any monitor we tested.

The PCXBV-DE did possess a few shortcomings, however. In subjective tests, some misconvergence was apparent in the bottom corners of the screen, and moiré pattern distortion was visible in screens with closely spaced vertical lines. And although maximum usable brightness was sufficient, the brightness control range did not offer the flexibility it should have. Still, in most respects, the PCXBV-DE was a consistent performer, even at the higher 1,024- by 768-pixel resolution.

The similarly equipped PCXBV-BC uses a 15-inch flat-square tube and supports a vertical refresh rate of 72 Hz at its maximum 1,024-by-768 resolution. Unfortunately, the PCXBV-BC didn't come close to performing as well as its 14-inch counterpart.

Although the PCXBV-BC did not reveal any of the moiré patterns that we saw in the smaller model, the 15-inch PCXBV-BC had one of the poorest composite scores in this roundup. The two main failings responsible for this result were the monitor's below-average maximum usable brightness score and

Digital PCXBV-BC

poor misconvergence score.

The lack of brightness tends to make the PCXBV-BC look dull under certain lighting conditions, and we found the misconvergence detected by the SuperSpot 100 translated into some color-registration errors in subjective evaluations.

The one bright spot proved to be the PCXBV-BC's stability in switching between video modes. None of the noisy clicks or distracting image scrambling witnessed on other monitors were evidenced by the 15-inch Digital display.

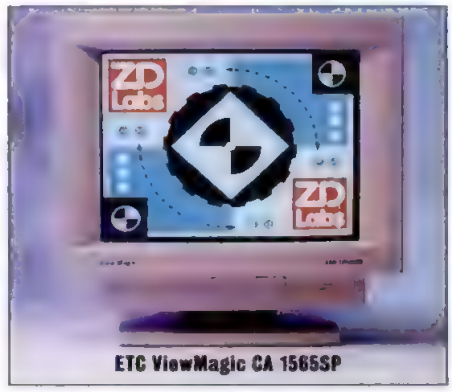
Although reasonably priced, neither one of these Digital monitors is about to unseat any of the mainstream monitor leaders. However, the 14-inch PCXBV-DE is definitely worth serious consideration.

ETC Computer Inc.

ETC ViewMagic CA-1464SP
ETC ViewMagic CA-1565SP

BY ALFRED POOR

The $529 14-inch ETC ViewMagic CA-1464SP and the $739 15-inch ETC ViewMagic CA-1565SP come with a variety of high-tech details at premium prices. However, the image quality for both monitors is good but not great, making these units less appealing than some others in this roundup.



ETC ViewMagic CA 1565SP

The CA-1464SP is based on a conventional tube that is designed to handle a maximum resolution of 1,280-by-1,024 at 60 Hz. At a more reasonable resolution of 1,024-by-768, the monitor's refresh rate rises to a flicker-freezing 76 Hz.

On our objective tests, the CA-1464SP turned in the second-best misconvergence test score (3.6 mils). Only the ADI MicroScan 3GP Low Radiation had a better misconvergence result. Also excellent was the CA-1464SP's seventh-best finish on our maximum usable brightness test. On the downside, the CA-1464SP had the fifth-worst modulation transfer function score and tenth-worst pincushioning test result. These placed the monitor's composite score into the lower half of our test group.

Subjectively, however, the unit's image was above average for a 14-inch screen. Changing between VGA and higher resolutions was handled with a fade, but there was still some slight scrambling of the image accompanied by an audible click.

The CA-1565SP is expensive compared with most of its competition, but like its 14-inch colleague, it provides a good image and lots of features. The monitor is based on a flat-square tube and, like the smaller model, can handle images at 1,280-by-1,024 resolution at 60 Hz and 1,024-by-768 at 76 Hz.

The image on the screen was one of the best in our test group: sharp and clear. The numbers back up the subjective observations, with an excellent score on our misconvergence test (where it was tied with its smaller sibling for second place) and on our pincushioning test.

The digital controls on these two monitors handle everything from brightness and contrast to pincushioning and trapezoidal adjustments. There is even an image-rotation setting that is unusual for monitors at any price. Even more unusual is the on-screen menu system for adjusting the various settings. You can even trigger a monitor self-test using the control buttons. The on-screen menu is a welcome feature, as it also displays the current image resolution, but it pops up every time you change resolutions, which could become annoying. Both monitors are rated as MPR II–compliant.

Both the ETC ViewMagic CA-1464SP and CA-1565SP are expensive monitors with good image quality and a full set of features. The biggest question is whether the extra features are worth the extra cost.

GoldStar Technology Inc.

GoldStar Model 1510

BY BRUCE BROWN

A mediocre overall performer, GoldStar Technology's $799.95 GoldStar Model 1510 is nonetheless equipped with a comprehensive set of digital and analog image-adjustment controls. The GoldStar's overall performance results would have been better, but the monitor was hampered by its very low screen brightness test result.

The GoldStar has a Hitachi flat-square 15-inch tube with a 13.6-inch active screen size. The monitor supports a maximum

GOOD

Genesis 486SX-33

- 4 MB RAM
- 212 MB Hard Drive
- 512 KB Local Bus Windows™ Accelerator for 1024x768
- 14" SVGA Monitor
- 5 16-bit ISA Slots

$1,299 Lease $49/month*

Genesis 486DX-33

- 4 MB RAM, 128 KB L2 Cache
- 212 MB Hard Drive
- 512 KB Local Bus Windows Accelerator for 1024x768
- 14" NI SVGA Monitor
- 5 16-bit ISA Slots

$1,599 Lease $60/month*

Ready to move up to the power and performance of a next-generation computer system? Here's some news to help accelerate your purchase decision: Austin Computer Systems just lowered the price of our most popular desktops.

Now, for less than you expect, you can equip your entire office with lightening fast, high-performance systems.

But the good news doesn't end there. Feature for feature, no other direct seller offers you so much for so little.

Whether you prefer a high-performance 486-based system or a blazing Pentium™ processor-powered desktop that comes with a 15" NI SVGA Monitor, you'll get a computer that's fully loaded without being fully priced.

PC MAGAZINE EDITORS' CHOICE

PC MAGAZINE READERS' CHOICE

MICROSOFT WINDOWS READY-TO-RUN

intel inside

yes NetWare Tested and Approved

PC WORLD BEST SERVICE AND BEST SUPPORT

NEWS.

Even Better News!
FREE MediaMagic™ ISP-16 Audio Board**

Premier 486DX2-50

- 8 MB RAM, 128 KB L2 Cache
- Sony Double-spin CD-ROM Drive
- 425 MB Hard Drive
- Diamond Stealth 32™ VL-Bus Windows Accelerator with 2MB
- 15" NI SVGA Monitor
- 2 VL-Bus and 5 ISA 16-bit Slots
- Softbank "On Hand"™ CD-ROM sampler disk

$2,199 Lease $83/month*

Premier P5-60

Intel Pentium™ Processor

- 8 MB RAM, 256 KB L2 Cache
- Sony Double-spin CD-ROM Drive
- 425 MB Hard Drive
- Diamond Stealth 32™ PCI-Bus Windows Accelerator with 2MB
- 15" NI SVGA Monitor
- 2 PCI, 1 PCI/ISA, and 4 ISA Slots
- Softbank "On Hand"™ CD-ROM sampler disk
- 17" SVGA monitor upgrade available

$2,999 Lease $105/month*

Plus, you automatically get our extendable two-year limited warranty on parts and labor, with first year on-site service, and lifetime toll-free technical support.

Whether you need a network of state-of-the-art desktops or a single high-performance laptop, call Austin Computer Systems. We're full of good news on the newest goods in the industry.

Call Direct 1-800-483-9938

Austin Computer Systems • An IPC Company • 10300 Metric Blvd., Austin, TX 78758
FAX: 512-454-1357 • Overseas: 512-339-3500 • Canada: 1-800-338-1565

AUSTIN
AN IPC COMPANY

©1994 Austin Computer Systems. All rights reserved. MediaMagic is a trademark of IPC Corporation LTD. The Intel Inside logo is a registered trademark and Pentium is a trademark of Intel Corporation. Microsoft is a registered trademark and Windows and the Windows logo are trademarks of Microsoft Corp. On Hand is a trademark of Softbank Inc. Stealth 32 is a trademark of Diamond Computer Systems, Inc. All other company names and products are trademarks or registered trademarks of their respective owners. Prices and specifications are subject to change without notice. *Lease term reflects 36-month contract. **With any of these advertised configurations. Offer good thru March 31, 1994.

TRAVELS

Austin 425

- 486SX-25 Processor
- 4 MB RAM
- 127 MB Hard Drive
- 32-bit Local Bus Video and Windows™ Accelerator
- 1 MB Video RAM
- Two PCMCIA Slots
- Front-and-center Trackball
- Monochrome Display

$1,599 Lease $60/month*

Austin 425C

- 486SX-25 Processor
- 4 MB RAM
- 127 MB Hard Drive
- 32-bit Local Bus Video and Windows Accelerator
- 1 MB Video RAM
- Two PCMCIA Slots
- Front-and-center Trackball
- Dual Scan Color Display

$2,199 Lease $82/month*

No matter where your work takes you, take your work with you. Without compromising for a nanosecond on features, performance, or power.

How? With a portable, practical notebook from Austin Computer Systems.

Pick and choose the notebook that fits your budget and your purpose. Our wide range of products includes a very affordable monochrome display model, an aggressively priced dual scan color display, and a color TFT Active-Matrix notebook. All include a simultaneous CRT and LCD display.

As you would expect from Austin Computer Systems, our notebooks provide you with an extendable, one-year limited warranty on parts and labor; and lifetime toll-free technical support.

PC MAGAZINE EDITORS' CHOICE

PC MAGAZINE READERS' CHOICE

MICROSOFT WINDOWS READY-TO-RUN

intel inside

yes NetWare Tested and Approved

PC WORLD BEST SERVICE AND BEST SUPPORT

FAST.

Austin 466C

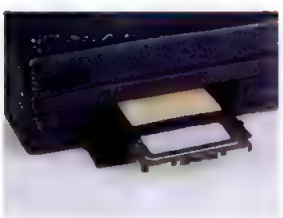
- 486DX2-66 Processor
- 8 MB RAM
- 250 MB Hard Drive
- 32-bit Local Bus Video and Windows Accelerator
- 1 MB Video RAM
- Two PCMCIA Slots
- Front-and-center Trackball
- Dual Scan Color Display

$2,999 Lease $112/month*

Austin 466T

- 486DX2-66 Processor
- 8 MB RAM
- **524 MB Hard Drive**
- 32-bit Local Bus Video and Windows Accelerator
- 1 MB Video RAM
- Two PCMCIA Slots
- Front-and-center Trackball
- TFT Active-Matrix Color Display

$4,499 Lease $157/month*



PCMCIA Expandability
Two PCMCIA slots take two Type II or one Type III devices for fax modems, LAN adapters, sound boards and more.

Whether you need high-performance notebooks that are ready to run when you are or a network of state-of-the-art desktops, call Austin Computer Systems.

We'll help get your show on the road. Fast.

524 MB HD NOW AVAILABLE
Call for details

Call Direct 1-800-483-9938

Austin Computer Systems • An IPC Company • 10300 Metric Blvd., Austin, TX 78758
FAX: 512-454-1357 • Overseas: 512-339-3500 • Canada: 1-800-338-1565

AUSTIN
AN IPC COMPANY

CIRCLE 012 ON READER SERVICE CARD

©1994 Austin Computer Systems. All rights reserved. The Intel Inside logo is a registered trademark of Intel Corporation. Microsoft is a registered trademark and Windows and the Windows logo are trademarks of Microsoft Corp. All other company names and products are trademarks or registered trademarks of their respective owners. Prices and specifications are subject to change without notice. *Lease term reflects 36-month contract.

noninterlaced resolution of 1,024-by-768. Although it's rated to run at a 72-Hz vertical refresh rate in 1,024-by-768 resolution, the GoldStar would operate only at a maximum rate of 70 Hz during our testing. The GoldStar does not meet Energy Star requirements for power conservation. Also, the monitor is not compliant with MPR II emissions standards.

The GoldStar did well on all of our objective tests except for our maximum usable brightness test. The monitor's 13.7–foot-lambert score on our brightness test was the worst result for any of the tested monitors.

Modulation transfer function and pincushioning test results were both roughly average, and the GoldStar managed one of the best misconvergence scores in our roundup (3.7 mils). Only the ADI MicroScan 3G, ETC ViewMagic CA-1464SP, and ETC ViewMagic CA-1565SP had better misconvergence results.

Had it not been for the GoldStar's poor performance on our maximum usable brightness test, its composite score would have been better. But because of the poor brightness result, the GoldStar's composite score placed the unit in the bottom third of all tested monitors.

During our subjective evaluations of the GoldStar, neither misconvergence nor pincushioning was readily observable in the monitor's image. There was, however, significant image bouncing during regulation testing, and moderate bounce when switching between text and graphics modes.

The variable-frequency GoldStar monitor is controlled by a microprocessor and has both analog and digital user controls. The control panel uses an LED select button with up, down, recall, and save buttons.

Along with the usual brightness and contrast image-adjustment controls, the GoldStar includes controls for pincushioning distortion and trapezoidal distortion. The monitor also has automatic degaussing and color temperature–matching controls, which are unusual for monitors of this size.

GoldStar Model 1510

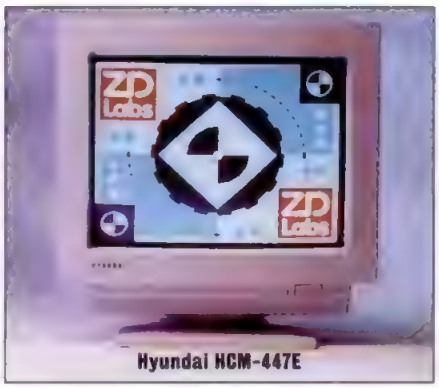
Except for its very dim screen, the GoldStar Model 1510 performs well. But unless your applications demand that you use a dim monitor, you may be better off looking elsewhere.

Hyundai Electronics America

Hyundai HCM-447E

BY BRUCE BROWN

The $599 14-inch Hyundai HCM-447E, from Hyundai Electronics America, was one of the worst-performing monitors in this roundup. It had less than lackluster results both in subjective evaluations and on our objective tests.



Hyundai HCM-447E

The HCM-447E has a 14-inch Samsung curved tube, with a 13.4-inch active screen size. The monitor is rated to run at a maximum 1,024-by-768 resolution at a 72-Hz vertical refresh rate. The unit's overall performance was poor, resulting in worse-than-average scores on all our objective measurements.

The HCM-447E's best scores on our objective tests came on our modulation transfer function (37 percent) and maximum usable brightness measurements (20.3 foot-lamberts). Unfortunately, both results were still below the average (fourteenth and nineteenth place from the bottom, respectively).

The rest of the HCM-447E's objective test results were much worse. On our pincushioning tests, the HCM-447E's performance placed it next to last. Also second from the bottom was the monitor's composite score. The only monitor that turned in worse numbers on both these measurements was the Packard Bell PB8549SVGL. Equally unimpressive on our misconvergence test, the HCM-447E finished third from the worst with a score of 8.4 mils. Only the Digital PCXBV-BC and Relisys RE-1564 had poorer results.

Our subjective examinations of the HCM-447E fully support the results of our objective measurements. We noticed that the misconvergence and pincushioning problems discovered by our SuperSpot 100 testing were readily apparent on the monitor's displayed image. We also found the image to be rather dull.

The HCM-447E exhibited no significant glare problems and no screen muddiness. Regulation testing, however, was poor, and there was observable bounce during video mode switching. In both 800-by-600 and 1,024-by-768 modes there were two audible clicks, some screen bounce, and miscellaneous image remnants when switching between full and partial DOS windows.

The variable-frequency HCM-447E isn't equipped with any special features. The monitor is non-microprocessor-controlled and has only an average selection of analog image-adjustment controls.

The HCM-447E does not support VESA's DPMS specification, and it doesn't comply with Energy Star power-conservation requirements. In addition, the monitor's magnetic field emissions don't fall within the standards set by the MPR II guidelines.

In sum, the Hyundai HCM-447E was one of the least impressive monitors we tested. Its performance was significantly below the average on all measures of objective testing and subjective evaluation.

IBM Personal Computer Co.

IBM 14P Color Monitor
IBM 15P Color Monitor

BY DON CRABB

The $633 14-inch IBM 14P Color Monitor and the $807 15-inch IBM 15P Color Monitor, from the IBM Personal Computer Co., are among the most expensive units in their respective test classes. Both units are multifrequency autosyncing monitors that have digital brightness,

MediaMagic.™

The Trick to Mastering Multimedia.

A family of audio boards that perform like magic.

There's a trick to getting the most from multimedia. It's MediaMagic™. Our full-family of audio boards and sound systems deliver high-quality sound and outperform the competition without their high price or difficult installation.

Introducing the ISP-16 Audio Board. $99

When multimedia is more than a game.

The ISP-16 is big news for cost-conscious users. At just $99, you can buy two boards for the price of one Sound Blaster 16. And the features are identical. Both have 16-bit stereo sound, record and playback, 20-voice FM synthesis and CD-ROM interface. But only our ISP-16 supports popular Sony CD-ROM drives. Get our professional quality ISP-16 for a game-board price. Or upgrade to the ISP-16 Sound System, complete with CD-ROM drive, custom speakers and popular CD-ROM titles for hundreds less than our competition.

Enhance your multimedia experience with DSP-16 — For affordable, high-performance sound.

MediaMagic Digital Signal Processor (DSP) boards offer quality digital audio at affordable prices. You get 16-bit, 48kHz stereo, a CD-ROM interface and a joystick/MIDI port all in one package. Unlike other boards, the DSP-16 is compatible with AdLib, Sound Blaster, Business Audio, Windows Sound System and MPC-2. DSP-16 will also support future audio standards with a simple software upgrade while other boards just become obsolete.

Products:	Digital Audio	Upgrades	Wave Table	CD ROM	Real Time MPEG Audio	Price*
MediaMagic™ DSP-16 Plus	16-bit 48 Khz	Yes	Standard	SCSI	Yes (encode/decode)	$259.00
Sound Blaster 16 ASP	16-bit 44 Khz	Yes	Expensive Upgrade	Proprietary	No	$349.95
ProAudio Spectrum-16	16-bit 44 Khz	No	No	SCSI	No	$299.00

*Base SRP

DSP-16 SCSI and DSP-16 Plus — The ultimate in multimedia sound.

MediaMagic DSP-16 SCSI and DSP-16 Plus Audio Boards have all the features of the DSP-16 and more! Choose the DSP-16 Plus for MPEG II real-time data compression and WaveMagic, the wavetable MIDI synthesis professional musicians use. Or choose the affordable DSP-16 SCSI, and upgrade to WaveMagic with MPEG II later!

MediaMagic Sound Systems — The complete multimedia solution.

We've combined our powerful Media Magic audio boards with Sony and Toshiba CD-ROM drives, high-quality stereo speakers and popular CD-ROM titles for turnkey multimedia solutions that are powerful, affordable and easy to use.

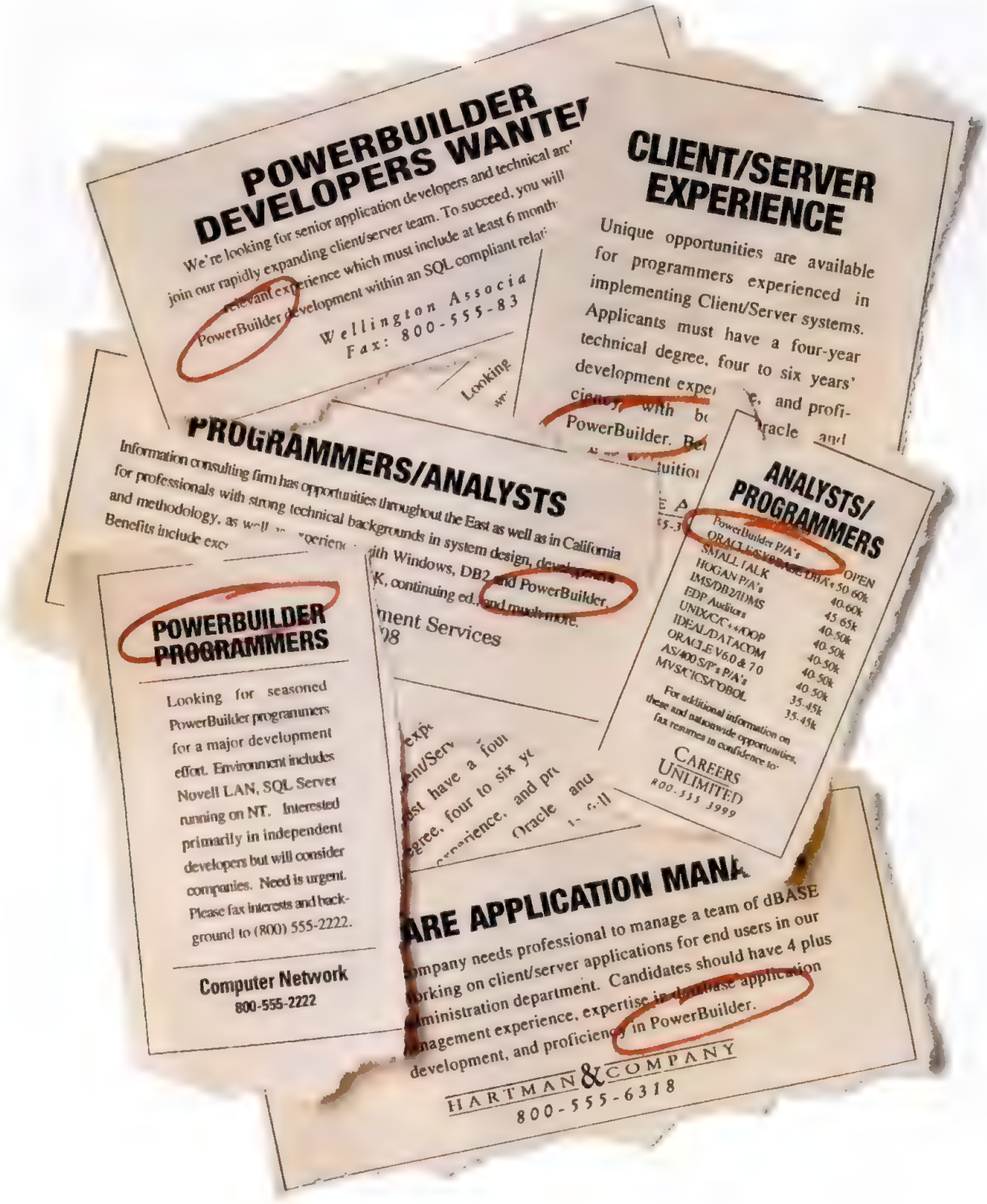
For your nearest dealer, or for more information, call:

800-624-8654

MEDIA MAGIC™

CIRCLE 325 ON READER SERVICE CARD

USA: MediaMagic, a division of Austin Computer Systems, 10300 Metric Blvd., Austin, Texas 78758. Tel: 800-624-8654. Fax: 512-454-1357. International: IPC Corporation LTD, 23 Tai Seng Drive, Singapore 1953. Tel: 65-744-2688. Fax: 65-287-6806.
© 1994 MediaMagic, a division of Austin Computer Systems. All rights reserved. MediaMagic is a trademark of IPC Corporation LTD. All other company, [illegible] registered trademarks of their respective owners. Specifications subject to change without notice.



POWERBUILDER DEVELOPERS WANTE

We're looking for senior application developers and technical arc
join our rapidly expanding client/server team. To succeed, you will
relevant experience which must include at least 6 month
PowerBuilder development within an SQL compliant relati

Wellington Associa
Fax: 800-555-83

Looking

CLIENT/SERVER EXPERIENCE

Unique opportunities are available for programmers experienced in implementing Client/Server systems. Applicants must have a four-year technical degree, four to six years' development expe , and profi-
cienc with b racle and
PowerBuilder. Be
uition

PROGRAMMERS/ANALYSTS

Information consulting firm has opportunities throughout the East as well as in California for professionals with strong technical backgrounds in system design, devel
and methodology, as well as experienc ith Windows, DB2, and PowerBuilder,
Benefits include exc K, continuing ed and much more.

ment Services
08

ANALYSTS/ PROGRAMMERS

PowerBuilder P/A's	
ORACLE/SYBASE DBA's	50-60k
SMALLTALK	OPEN
HOGAN P/A's	40-60k
IMS/DB2/DMS	45-65k
EDP Auditors	40-50k
UNIX/C/C++/OOP	40-50k
IDEAL/DATACOM	40-50k
ORACLE V6.0 & 7.0	40-50k
AS/400 S/P's P/A's	40-50k
MVS/CICS/COBOL	35-45k
	35-45k

For additional information on these and nationwide opportunities, fax resumes in confidence to:

CAREERS UNLIMITED
800-555-3999

POWERBUILDER PROGRAMMERS

Looking for seasoned PowerBuilder programmers for a major development effort. Environment includes Novell LAN, SQL Server running on NT. Interested primarily in independent developers but will consider companies. Need is urgent. Please fax interests and background to (800) 555-2222.

Computer Network
800-555-2222

exp
ent/Serv
ust have a four
egree, four to six ye
perience, and pr
Oracle and
ell

ARE APPLICATION MANA

ompany needs professional to manage a team of dBASE
orking on client/server applications for end users in our
dministration department. Candidates should have 4 plus
anagement experience, expertise in database application
development, and proficiency in PowerBuilder.

HARTMAN & COMPANY
800-555-6318

Credentials for sale: $249.

When it comes to developing client/server applications, the success of PowerBuilder™ is evident simply by glancing at the front pages of almost any trade journal. *InfoWorld* and *LAN Magazine* both called it "Product of the Year." *DBMS* gave it two Readers' Choice Awards. And *Windows Sources* honored it with its Experts' Pick Award.

But PowerBuilder's popularity is just as obvious when you peruse the back pages of a publication. For there you can see how many companies need programmers with experience in the industry's most proven client/server development tool.

So you'll be glad to know that PowerBuilder, previously available to developers with corporate IS needs and resources, is now available to desktop database developers as well.

Thanks to new PowerBuilder Desktop. A version of PowerBuilder created specifically for your standalone and networked desktop-class databases.

Similar to PowerBuilder Enterprise, this edition lets you create applications using a common object technology. A technology that lets your programs, as well as your programming know-how, be scaled to run against any database from .DBF to DB2®.

With hundreds of built-in functions, and tools that include our "SQL Smart" DataWindow™ and a built-in data dictionary, you can build those applications with a simplicity that's unmatched in a Windows® environment. And, with the full 32-bit relational power of the WATCOM™ SQL database, you can build and deploy standalone applications right out of the box.

If that's not appealing enough, for a limited time, you can get PowerBuilder Desktop at the introductory price of $249. Simply call your corporate reseller or stop by CompUSA. Or call Powersoft at 1-800-946-3500 and we'll tell you the nearest location and date of our one-day comprehensive client/server training class that includes your own copy of PowerBuilder Desktop for just $399.

After all, the price of becoming a client/server developer is a lot lower than the price of not becoming one.

Powersoft.™

Building on the power of people.

Powersoft Corporation, 70 Blanchard Road, Burlington, MA 01803
Powersoft Europe, Thames House, 1 Bell Street, Maidenhead, Berkshire, SL6 1BU, United Kingdom

All trademarks and registered trademarks are property of their respective owners. Prices listed do not include sales tax, shipping and handling. 30-day money back guarantee.

CIRCLE 345 ON READER SERVICE CARD

contrast, and image controls.

The IBM 14P, which uses a 14-inch Matsushita tube with a 13.1-inch active screen size, did much better on our objective tests than in our subjective evaluations. The monitor has a maximum resolution of 1,280-by-1,024 at a vertical refresh rate of 60 Hz. It handled the more reasonable 1,024-by-780 resolution with a higher refresh rate of 70 Hz, but the image suffered from noticeable graininess.

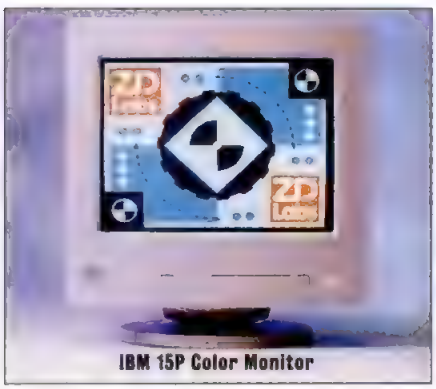
In SuperSpot 100 testing, the IBM 14P turned in decent scores. Its composite score and its performance on the modulation transfer function test were in the upper quarter of our test group. Also, the monitor came in fifteenth on our pincushioning test and had an above-average misconvergence rating.

The IBM 14P did not fare as well in our subjective evaluations. We found the monitor's image often appeared grainy and muddy at all resolutions, and there were a number of other noticeable defects. We discovered considerable, distracting pincushioning, and we found some misconvergence, although it was not severe.

The IBM 15P uses a Matsushita 15-inch tube with a 13.8-inch active screen size. It supports a maximum resolution of 1,280-by-1,024 at 60 Hz and a 1,024-by-780 resolution at a refresh rate of 70 Hz.

The IBM 15P did better than the smaller IBM 14P on all of our objective tests except the pincushioning and misconvergence tests. The IBM 15P's composite score and its performance on the pincushioning test were in the upper quarter of all tested monitors. The IBM 15P had the highest result of all tested units on our modulation transfer function test, and it also produced an above-average misconvergence rating.

Like its smaller cousin, the IBM 15P did not fare as well in subjective testing. It had the same muddy image and noticeable defects of pincushioning and misconvergence.



IBM 15P Color Monitor

Both IBM monitors have pincushioning, color, and keystone controls for image adjustments, which are nice pluses. Like most of the monitors we tested, both IBM's lacked convergence controls.

Overall, the IBM monitors did much better on our objective tests than in our subjective evaluations. Our SuperSpot 100 testing did not reveal the units' grainy and often muddy images or measure the machines' flawed aesthetics and clunky-looking cases. We'd take a pass on these monitors, especially given their very high list prices.

KFC-USA Corp.

KFC CM-1428MD2
KFC CA-1508

BY ALFRED POOR

The two monitors from KFC-USA Corp., the $380 14-inch KFC CM-1428MD2 and the $515 15-inch KFC CA-1508, provide good images at attractive prices. The CM-1428DM2 is one of the lowest-priced monitors we tested. Even at this low price, you get digital image-adjustment controls—although they are limited—and good image quality.

The CM-1428DM2 uses a 14-inch conventional tube manufactured by either Hitachi or NEC, depending on availability. The monitor is capable of displaying images at 1,024-by-768 at 70 Hz and 800-by-600 at 72 Hz.

According to its objective test results, the unit's maximum brightness is a bit limited, but subjectively the monitor appears to be sufficiently bright. There are some small but noticeable misconvergence problems, and though the unit scored poorly on the pincushioning test, these flaws were not dramatically visible in any case. Switching from high-resolution graphics to VGA produced only minimal image scramble, while the switch back was masked by a smooth fade. Overall, the CM-1428DM2's image was quite sharp—surprisingly good for a monitor of this size at this price.

Like its 14-inch stablemate, the 15-inch KFC CA-1508 has a relatively low list price for its class. The CA-1508 also follows suit by offering a wealth of features and good image quality.

KFC CA-1508

The CA-1508 is based on a 15-inch flat-square tube; it is capable of producing images at resolutions of up to 1,280-by-1,024 at 60 Hz and easily supports the VESA-standard modes of 1,024-by-768 at 70 Hz and 800-by-600 at 72 Hz. The monitor was able to switch between VGA and higher-resolution modes with a smooth fade, and while there were some noticeable misconvergence flaws, the image was still sharp. The weakest part of the monitor's performance was its limited maximum brightness: Some users may need to crank it all the way up in bright working environments.

The KFC CA-1508 comes with a comprehensive set of digital controls, including pincushioning, trapezoidal, and rotation adjustments (the rotation feature is unusual for monitors at any price). For the conservation-minded, the CA-1508 complies with the EPA's Energy Star standard and is compatible with VESA's DPMS specification. Both KFC monitors are rated as MPR II–compliant.

The KFC CA-1508's low price, combined with above-average image quality and a full feature set, makes this an especially attractive value for a 15-inch monitor. Similarly, the KFC CM-1428DM2 makes a good choice for a 14-inch monitor because of its good image quality, above-average features, and budget-minded price.

Liberty Electronics

Liberty CL-9015

BY ALFRED POOR

At $329, the 14-inch Liberty CL-9015 is one of the lowest-priced monitors in this roundup. It also boasts a number of advanced features, including digital image-

Why buy Glare/Guard® anti-glare filters?

Good for you and your company.

The best available eye protection you can get. Plus, the most reliable radiation protection. That's why more computer users worldwide trust Glare/Guard® to improve display viewability and reduce eyestrain, headaches and fatigue associated with computer vision syndrome (CVS). CVS affects more than 10 million U.S. computer users annually.*

The only filter professionally accepted worldwide. Glare/Guard is tested for Sweden's MPR II and TCO monitor radiation compliance; and accepted or certified for vision protection by the prestigious Dortmund Institute and TÜV Laboratory of Germany, the French National Testing Laboratory, and the American Optometric Association.

Double your safety. Not only are your eyes protected from the harmful effects of prolonged computer use, but because Glare/Guard uses tempered safety glass, breakage hazards are eliminated.

Glare/Guard® by OCLI

Eye protection is our only business.

The widest range of filters. Choose from more levels of protection, in more frame styles and sizes than any other filter. Glare/Guard comes in flat, contour and custom-fit filters from 9" to 22" for color and black-and-white monitors. All priced to fit any budget.

Setting the standards for innovation. Glare/Guard's patented anti-glare technology was first developed for use on NASA's manned space flights in 1962. And we were the first to coat both sides of the filter, employ the use of tempered safety glass, patent adjustable mounting systems, and develop the wrap-around frame and a reliable anti-radiation system. Count on Glare/Guard to set the standards for the next generation of eye protection.

Lifetime warranty.** Glare/Guard's unparalleled research, development and manufacturing ensure a lifetime of maximum eye protection for you and your employees.

For FREE CVS information and the dealer nearest you, call:

1-800-545-6254

*Source: Journal of the American Optometric Association, 10/92

**Standard model comes with one year warranty.

CIRCLE 223 ON READER SERVICE CARD

PC315

Liberty CL-9015

adjustment controls. But the CL-9015's poor display quality, which became apparent during our subjective evaluations, leaves the unit near the bottom of the stack.

The CL-9015 is based on a standard 14-inch Hitachi tube (as opposed to the newer flat-square design) that can only handle its maximum noninterlaced resolution of 1,024-by-768 at just a 60-Hz vertical refresh rate. The monitor can manage a higher 72-Hz refresh rate, but only at an 800-by-600 resolution. These limited resolutions and refresh rates would not be a problem for applications for which 800-by-600 images are sufficient, but there are also limits to the CL-9015's image quality.

Our objective tests found the CL-9015 performance to be somewhat lacking. The Liberty monitor had one of the worst scores of the test group on the misconvergence test: It placed fourth from the bottom, with only the Digital PCXBV-BC, Hyundai HCM-447E, and Relisys RE-1564 providing poorer numbers.

The CL-9015's performance on the rest of our objective tests was also clearly worse than average. The monitor's pincushioning measurement was eleventh from the bottom. The CL-9015's performance placed the unit in the lower third of our test group on both our modulation transfer function and maximum usable brightness tests. The monitor's composite score placed the unit sixth from the bottom.

During our subjective evaluation of the CL-9015, we found that the flaws discovered by our objective examinations were easy to spot just by looking at the monitor's displayed image. We noted both pincushioning and misconvergence, which made the screen image distracting to view. The CL-9015 also had particular problems with screen regulation (maintaining image size when the image changes). The CL-9015 is compliant with MPR II emissions standards, but the monitor does not meet Energy Star power-conservation requirements.

The Liberty monitor's digital controls are easy to use and offer the standard array of image-adjustment controls. These include controls for image position, image size, and pincushioning (although there is no trapezoidal distortion adjustment), as well as digital controls for brightness and contrast.

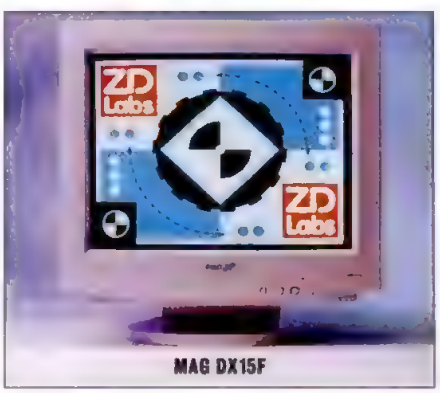
The Liberty CL-9015 may have strong appeal because of its aggressively low price, but unfortunately, because of its poor overall performance, it fails to deliver a competitive value compared with some of the other monitors in our roundup.

MAG InnoVision Inc.

MAG DX15F

BY ALFRED POOR

The list price of $439 for the MAG DX15F, from MAG InnoVision, would be competitive for a 14-inch monitor, but it is downright aggressive when you consider that the DX15F is a 15-inch monitor with a flat-square-tube design and is loaded with plenty of features. Unfortunately, the DX15F's image quality prevents it from being a top candidate in its category.



MAG DX15F

The DX15F is built around a Hitachi 15-inch flat-square tube with a 14-inch active screen size. The monitor is designed to handle images with resolutions of up to 1,280-by-1,024 at a vertical refresh rate of 60 Hz. But users will most likely prefer to go no higher than a resolution of 1,024-by-768, which the monitor is rated to produce at a flicker-freezing 76 Hz.

On our objective tests, the DX15F turned in mixed results. The monitor had a good score on our misconvergence test, finishing in the top third of all the monitors we tested with a score of 4.2 mils. The DX15F had a pincushioning test score that was slightly better than average, at 13.3 mils, and it turned in an average maximum usable brightness result (22.3 foot-lamberts).

The DX15F, however, had one of the lowest scores on our modulation transfer function test. Only the Hitachi SuperScan 15s and Relysis RE-1564 had poorer results. The combination of unspectacular objective test results hampered the DX15F's composite score, which was in the lowest quarter of our test group.

During subjective examination of the DX15F, we found a noticeable red halo on the left edge and in the lower-right-hand corner of the image. Even after using the monitor's pincushioning adjustment, we found the edges of the DX15F's image were still visibly curved. The picture would also scramble when switching between VGA and a higher resolution. Overall, we found that the DX15F's display image was just not as crisp as those of other 15-inch flat-square designs.

MAG InnoVision equipped the DX15F with a wealth of impressive features. The monitor is MPR II–compliant and meets Energy Star requirements through support of the VESA DPMS signaling standard. Located on the front panel of the DX15F are easy-to-use digital image controls that include an adjustment for pincushioning distortion and a degaussing button. Also included are traditional analog controls for brightness and contrast.

The MAG DX15F is loaded with features and is one of the more attractively priced 15-inch monitors we tested. Unfortunately, the monitor's image quality is not truly competitive.

Mitsuba Corp.

Mitsuba M715VS

Sceptre Technologies Inc.

Sceptre CC-615L

BY JOHN R. QUAIN

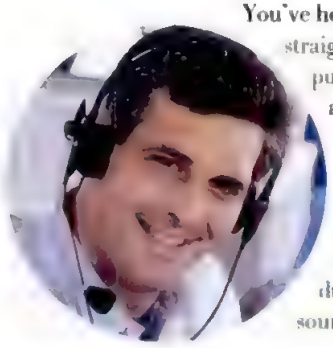
The $495 Mitsuba M715VS, from Mitsuba Corp., and the $550 Sceptre CC-615L, from Sceptre Technologies, are identical

Multimedia without the mumbo jumbo.

And we'll deliver it loaded, tested and ready to run.

John Craig
PC Consultant

Get the right answers. Right away.
When you call IBM PC Direct™, you'll get expert advice to help you put together exactly the right multimedia system, whether it's for business presentations, your home office or your family.



You've heard enough cyberspeak. You want straight answers, from an expert, about putting multimedia to work right away. That's why you should call us about this eye-popping offer.

It's our Reference Package, a warehouse of information to help you work smarter and more productively. Interactive sight and sound are built in and ready to go.

It's a multimedia – and business – PC you can use today. It's preconfigured at a price that's hard to beat. And it's only a phone call away.

The IBM Multimedia Reference Package

- i486™SX/25MHz Processor
- NEW IBM 14V borderless, energy-efficient Color Monitor
- 170 MB Hard Drive
- 4MB RAM
- 1MB Video Memory
- 1.44MB Diskette Drive
- Double-speed, multi-session-compatible CD-ROM drive
- Sound Blaster™ 16-bit audio card
- External speakers and microphone
- IBM 101-Key Basic Keyboard and IBM Mouse
- Conforms with Multimedia PC Marketing Council's Level 2 specification for maximum compatibility
- Kodak® Photo CD™ Access Software and Photo Sampler
- Software Toolworks™ Encyclopedia
- Microsoft® Bookshelf™
- HSC InterActive Presentation Tool™
- Microsoft Works™ for Windows
- IBM DOS 6.1 and Microsoft Windows™

Call 1 800 426-7938

8am-midnight M-F, EST
8am-7pm Sat., EST
Purchase order available for qualifying customers

IBM PC Direct

We're putting the personal in personal computing.

We'll configure any of our newest ValuePoint™ PCs the way you like. See the next page now!

Instant Gratification. We make
priced right and

What's new? The "V" series borderless, energy-saving monitors.[1] And Soft Select™ preinstalled software.

You want it all, right now. (That's O.K., people expect more from IBM.) For instance, you want the latest dazzling monitors.

So we created the new "V" series monitors with a sharp, borderless image. And they're so energy-efficient they've qualified for an EPA Energy Star rating.[2]

You said, "Installing software takes up too much time." So now we can do it for you at the factory with Soft Select. We test and optimize each application to work on your particular PC. And we give you customized configurations, plus the quality and support you expect from the world's largest computer company.

So go ahead, be demanding. We're ready for anything. Call us now.

IBM PC Direct

We're putting the personal in personal computing.

ValuePoint Si.
Conserve space and money.

- 3 expansion slots, 3 bays
- VESA Local Bus Video
- Pentium[†]-upgradable (except 425SX/Si)
- IBM Basic 101-Key Keyboard and IBM Mouse
- DOS and Windows preinstalled
- 512KB Video Memory
- Choose your IBM Color Monitor: 14L8, 14V (add $100 to base model price), 15V (add $250), 17V (add $670)

425SX/Si
i486SX/25MHz, 120MB HD, 4MB RAM
14L8 (IBM Credit Lease: $50/mo.**) $1,369*

433DX/Si
486DX/33MHz[‡] 120MB HD, 4MB RAM
14L8 (IBM Credit Lease: $62/mo.) $1,719*

433DX/Si
486DX/33MHz[‡] 212MB HD, 4MB RAM
14L8 (IBM Credit Lease: $66/mo.) $1,829*

466DX2/Si
i486DX2/66MHz, 212MB HD, 4MB RAM
14L8 (IBM Credit Lease: $80/mo.) $2,229*

ValuePoint DeskTop.
The modern-day workhorse.

- 5 expansion slots, 5 bays
- VESA Local Bus Video
- Pentium[†]-upgradable
- IBM Enhanced 101-Key Keyboard and IBM Mouse
- DOS and Windows preinstalled
- 1MB Video Memory
- Choose your IBM Color Monitor: 14L8, 14V (add $100 to base model price), 15V (add $250), 17V (add $670)

425SX/D
i486SX/25MHz, 212MB HD, 4MB RAM
14L8 (IBM Credit Lease: $57/mo.**) $1,589*

433DX/D
486DX/33MHz[‡] 212MB HD, 4MB RAM
14L8 (IBM Credit Lease: $70/mo.) $1,939*

450DX2/D
i486DX2/50MHz, 340MB HD, 4MB RAM
14L8 (IBM Credit Lease: $81/mo.) $2,259*

466DX2/D
i486DX2/66MHz, 340MB HD, 8MB RAM
14L8 (IBM Credit Lease: $100/mo.) $2,769*

t easy to get the PC you want, ready to go to work.

ValuePoint Mini-Tower®.
With room to grow.

- 8 expansion slots, 6 bays
- VESA Local Bus Video
- Pentium®-upgradable
- IBM Enhanced 101-Key Keyboard and IBM Mouse
- DOS and Windows preinstalled
- 1MB Video Memory
- Choose your IBM Color Monitor: 14L8, 14V (add $100 to base model price), 15V (add $250), 17V (add $670)

433DX/T
486DX/33MHz,† 340MB HD, 4MB RAM
14L8 (IBM Credit Lease: $80/mo.**) $2,219*

450DX2/T
i486DX2/50MHz, 340MB HD, 8MB RAM
14L8 (IBM Credit Lease: $93/mo.) $2,569*

466DX2/T
i486DX2/66MHz, 424MB HD, 8MB RAM
14L8 (IBM Credit Lease: $108/mo.) $2,989*

466DX2/T
i486DX2/66MHz, 527MB HD, 8MB RAM
14L8 (IBM Credit Lease: $113/mo.) $3,129*

Soft Select preinstalled software lets you hit the ground running.
We can preinstall many of your favorite applications, then thoroughly test and optimize them – all for only a $10 flat fee. When your new ValuePoint arrives, just plug it in and go. Of course, we also give you the diskettes, manuals and documentation. Installing software doesn't get any easier – or faster.

Here's just a sampling of IBM Soft Select applications.
Call for our latest additions

Microsoft® Office (WIN)
Intuit Quicken™ (WIN)
Borland Quattro Pro® (WIN)
Microsoft PowerPoint® (WIN)
WinFax™ Pro (WIN)
WordPerfect® (DOS)
IBM VoiceType™ Control (WIN)

Salil Muma,
HelpCenter®
Specialist

With HelpWare®, you're covered by the best support people in the business.
IBM HelpWare goes beyond ValuePoint's one-year warranty and our 30-day, hassle-free moneyback guarantee.‡ HelpWare is tech support people who are always there when you need them, 24 hours a day, 7 days a week. And it's one year of free onsite service, provided by thousands of dedicated IBM service reps who make house calls anywhere in the U.S., no matter how remote.‡

intel inside

Call 1 800 426-7938
8am-midnight M-F, EST
8am-7pm Sat., EST
Purchase order available for qualifying customers.

IBM®

Don Williams, Jr.
PC Consultant

When Don Williams, Jr. saw the new IBM monitors, he couldn't believe his eyes. He or any of our other PC consultants can't wait to give you the details. These monitors are available separately, or as part of an IBM ValuePoint we'll custom build for you. At a price that's easy on the eyes, too. Call today!

Our newest monitors are even easier on your eyes.

Not to mention your electric bill.

Who says you can't have it both ways? These advanced high-resolution monitors deliver a brighter, bolder, crisper, borderless image that's flicker free.

But when you're not using them, they'll automatically power down[2] to miserly energy consumption levels. When you resume work, just touch a key or the mouse and they'll power up instantly, right where you left off.

The "V" series: for new systems and upgrades, too.
Cross-platform compatibility is built in. You can plug it right into almost any IBM-compatible system and run most popular software. These monitors are available in 14", 15" and 17" screen sizes.

So, see the light. And save energy. Call IBM PC Direct today.

Complimentary!
It's the latest edition of the IBM PC Direct catalog. ValuePoints, ThinkPads®, printers, monitors, multimedia, software, and more. To get your copy, call **IBM PC DIRECT** *today.*

Add a CD-ROM drive and find out what you've been missing.
Practically all multimedia applications — and more and more regular software titles — are available in CD-ROM format. This internal ISA interface version has a 300KB/Sec maximum sustained data transfer rate with multi-session CD-ROM technology, including full Kodak CD compatibility. We can install it for you at the factory so it's ready to go when your IBM ValuePoint arrives.

ISA Internal CD-ROM Drive
(32G2961)..... **$245***

*IBM PC DIRECT prices only. The offerings, prices and products are subject to change or withdrawal without prior notice. Products you acquire may not be counted under any existing Volume Purchase Agreement. The same offerings and products may be available through IBM Authorized Remarketers. Remarketer prices may vary. Shipping and handling charges are extra. **IBM Credit Lease prices are quoted for 36-month terms. Lease rates quoted are good through 2/28/94, after which time rates are subject to change without notice. Lease available to qualified commercial customers only. † Some 486DX/33MHz processors may be manufactured by IBM. 1. Not all V-series monitors are compatible with all ValuePoint PCs. Please call your IBM PC DIRECT sales rep for further information. 2. Requires VESA-DPMS compatible system hardware and software to engage. 3. Upgradable with Intel's future OverDrive™ processor based on Pentium technology. 4. Copies of warranty and 30-day moneyback guarantee information available through IBM and IBM Authorized Dealers. Please call 1 800 426-2968 for details regarding IBM's moneyback guarantee and limited warranty. 5. At no additional charge during warranty period. Onsite service available Monday-Friday 8am-5pm in your time zone. IBM, ThinkPad, Mini-Tower, HelpCenter and HelpWare are registered trademarks, and ValuePoint and Soft Select are trademarks of International Business Machines Corporation. All other brands and product names are registered trademarks, trademarks or service marks of their respective holders. PC Direct is a trademark of Ziff Communications Company and is used by IBM under license.
©1994 International Business Machines Corporation.

Call 1 800 426-7938
8am-midnight M-F, EST
8am-7pm Sat., EST
Purchase order available for qualifying customers.

IBM PC Direct

We're putting the personal in personal computing.

monitors based on the same, Hitachi-manufactured, 15-inch flat-square tube with a 0.28-mm dot pitch.

While both the Mitsuba M715VS and the Sceptre CC-615L meet the MPR II standards for low emissions, neither monitor supports VESA's DPMS specification for power conservation or qualifies for Energy Star status. With a maximum noninterlaced resolution of 1,024-by-768 pixels at a 72-Hz vertical refresh rate, both models are equipped with analog brightness and contrast dials and digital button controls for image size and position adjustments.

In terms of these features, the Mitsuba and Sceptre monitors are identical. Also, there was little to distinguish them from one another in terms of their performance both on our objective tests and in subjective evaluations.

On nearly every one of our objective tests, both the Mitsuba and Sceptre monitors turned in average scores. The two units had very close misconvergence scores, and the Mitsuba did slightly better on our modulation transfer function test, while the Sceptre's pincushioning test performance far surpassed that of the Mitsuba.

Mitsuba M715VS and Sceptre CC-615L

Tests conducted in 800- by 600-pixel resolution on both the Mitsuba and Sceptre revealed a maximum usable brightness of 24 foot-lamberts, just above the average.

Subjective evaluations on the Mitsuba unit revealed no obvious problems, but a little misconvergence in focusing the monitor's three colors was apparent in one corner, and vertical and horizontal lines did not maintain consistent widths. Although the Sceptre CC-615L did not suffer from these shortcomings, it exhibited some minor moiré and color-registration problems.

In screen-regulation tests, both monitors bounced the image when objects were flashed on-screen. However, when switching between various video modes, each maintained its composure, making the transition between DOS and Microsoft Windows sessions without squealing, clicking, or scrambling the image.

Neither monitor distinguished itself at 1,024-by-768 resolution. On a screen composed of closely spaced letters, the edges of fonts lost some degree of focus. Displaying 1-pixel-wide lines also revealed further misconvergence in the left corners of both monitors' screens.

Apart from minor price and performance differences, it is difficult to distinguish these monitors from each other, and there is no compelling reason to single them out from the rest of the crowd.

▶ SUMMARY OF FEATURES CONTINUES

Mainstream Monitors

Price *List* indicates the vendor's suggested retail price; *street* indicates an estimated street price.

MPR-II compliance claimed A yes answer means that the vendor claims its monitor meets the Swedish government's electromagnetic emissions standards.

Energy Star–compliant means the monitor uses no more than 30 watts when inactive.

DPMS-compliant means the display powers down to Energy Star–prescribed levels by responding to changes in vertical- and horizontal-frequency signals, as outlined by the Video Electronic Standards Association (VESA).

Power consumption (watts) shows the monitor's maximum power consumption and the reductions the monitor achieves in each of its power-saving modes. We publish each monitor's claimed power consumption, excepting those of the AOC Spectrum Series 4N, the NEC MultiSync 3V and 4FGe, and the Nissei Sangyo/Hitachi SuperScan 15s; for these four units we provide estimates based on ZD Labs' test results, since the vendors did not provide this information.

Mitsubishi Electronics America Inc.

Mitsubishi Diamond Scan 15FS

BY JOHN R. QUAIN

Mitsubishi Electronics America's reputation as a leading monitor maker would seem to justify the rather high $645 price tag on the Mitsubishi Diamond Scan 15FS. But with its lack of power-saving features and its below-average image quality, the 15-inch Diamond Scan 15FS fails to justify its premium price.

Mitsubishi Diamond Scan 15FS

Using a flat-square tube with a 0.28-mm dot pitch, the Diamond Scan 15FS is MPR II–compliant and comes with digital controls for brightness, contrast, and all the standard image adjustments. The multifunction control buttons are all located up front for easy access, but selecting functions to make the correct changes can be awkward.

One benefit of this monitor is that it can reach an eye-saving 76-Hz vertical refresh rate at its maximum noninterlaced resolution of 1,024-by-768. Unfortunately, the Diamond Scan 15FS is not Energy Star–compliant and does not support the VESA DPMS signaling standard. Computer shoppers will also find the monitor's performance significantly below par.

In 800-by-600 mode, the Diamond Scan 15FS showed a marked weakness on our misconvergence test; it had the fifteenth-worst misconvergence score

▶ SUMMARY OF FEATURES

14- and 15-Inch Monitors

■ 14-inch monitor ■ 15-inch monitor

■ = YES □ = NO	Aamazing CM-1528	Addonics C143	Addonics C152/LR	ADI MicroScan 3G Low Radiation	ADI MicroScan 3GP	ADI MicroScan 4G Low Radiation	ADI MicroScan 4GP	Amax Impression 3
Price	$694.00 (list)	$320.00 (list)	$470.00 (list)	$395.00 (street)	$410.00 (street)	$475.00 (street)	$490.00 (street)	$299.00 (list)
Company	Aamazing Technologies Corp	Fora International Corp.	Fora International Corp.	ADI Systems Inc.	ADI Systems Inc.	ADI Systems Inc.	ADI Systems Inc.	Amax Engineering Corp.
Address	1050 W. Beacon St., Brea, CA 92621	30 W. Montague Expwy., San Jose, CA 95134	30 W. Montague Expwy., San Jose, CA 95134	2115 Ringwood Ave., San Jose, CA 95131	2115 Ringwood Ave., San Jose, CA 95131	2115 Ringwood Ave., San Jose, CA 95131	2115 Ringwood Ave., San Jose, CA 95131	3288 Laurelview Ct., Fremont, CA 94538
Toll-free number	None	800-336-3962	800-336-3962	800-228-0530	800-228-0530	800-228-0530	800-228-0530	800-800-6328
Toll number	714-255-1688	408-943-0100	408-943-0100	408-944-0100	408-944-0100	408-944-0100	408-944-0100	510-651-8886
Fax number	714-255-1686	408-943-0714	408-943-0714	408-944-0300	408-944-0300	408-944-0300	408-944-0300	510-651-4119
Warranty	1 year	2 years	2 years	2 years	2 years	2 years	2 years	2 years
Reader service card number	465	481	482	466	467	468	469	470
Tube manufacturer	Hitachi	Matsushita	Hitachi	Hitachi, Toshiba	Hitachi, Toshiba	Hitachi, Toshiba	Hitachi, Toshiba	Matsushita
Active screen size (diagonal, in inches)	13.8	12.8	13.8	13.5	13.5	13.6	13.8	13
Dimensions (HWD, in inches)	14.4 x 14.1 x 14.6	13.5 x 14 x 15	14.4 x 14.4 x 15.2	14.5 x 14.5 x 15	14.5 x 14.5 x 15	14.5 x 14.5 x 15	14.5 x 14.5 x 15	14.6 x 14.3 x 15
Weight (pounds)	28	26	29	25	27	31	31	26
MPR-II compliance claimed	□	□	■	□	■	□	■	□
Energy Star–/DPMS-compliant	□□	□□	□□	□□	■■	□□	■■	□□
Operational Features								
Video bandwidth (MHz)	85	65	80	75	75	75	75	75
Vertical scanning frequency (Hz)	47–104	50–90	50–90	50–100	50–100	50–100	50–100	50–100
Horizontal scanning frequency (kHz)	28–64	31.5–48	31–60	30–64	30–64	30–64	30–64	30–60
Maximum noninterlaced refresh rates (Hz)								
1,280 x 1,024, 1,024 x 768	60, 72	N/A, 60	N/A, 72	60, 76	60, 76	60, 76	60, 76	N/A, 72
800 x 600, 640 x 480	72, 72	72, 72	72, 72	90, 100	90, 100	90, 100	90, 100	72, 72
Power consumption (watts)								
Maximum, Standby modes	90, N/A	90, N/A	110, N/A	85, N/A	85, N/A	90, N/A	90, N/A	85, N/A
Suspend, Off modes	N/A, N/A	N/A, N/A	N/A, N/A	N/A, N/A	15, 4	N/A, N/A	15, 4	N/A, N/A
Controls								
Type of controls	Analog	Analog	Digital	Digital	Digital	Digital	Digital	Digital
Color matching	□	□	□	■	■	■	■	■
Pincushioning/Trapezoidal adjustment	□□	□□	■□	■□	■□	■□	■□	■■
Manual/automatic degaussing	□■	□■	□■	□■	□■	□■	□■	□■

N/A—Not applicable. The product does not have this feature.

among all the monitors. Furthermore, the unit's poor maximum image brightness proved to be a significant problem.

During subjective evaluations, we were unable to get a sufficiently bright image, which made some detailed graphics look muddy and prevented white backgrounds from looking as clean as they should. SuperSpot 100 testing confirmed these findings, with the composite score putting the Diamond Scan 15FS in the bottom 25 percent.

On the positive side, pincushioning was not a problem this monitor faced. Blooming—the excessive blurring of a bright object against a dark background—was also not a difficulty we encountered (partly because of the monitor's extremely low brightness levels).

At its maximum resolution of 1,024-by-768, the Diamond Scan was unable to bring the image out to the full screen width with more than a quarter-inch of black left on each side of the display. A screen crammed with closely spaced letters also proved to be difficult to read at this resolution.

In the final analysis, the Diamond Scan 15FS is not a recommended monitor. Even with its three-year warranty, there is nothing exceptional about this Mitsubishi entry.

Nanao USA Corp.

Nanao FlexScan F340iW

BY BRUCE BROWN

Although Nanao USA Corp.'s $799 Nanao FlexScan F340iW turned in test scores that were slightly worse than the average, subjective evaluation made it clear that this model upholds Nanao's reputation for producing top-quality monitors.

Based on a 15-inch-diagonal Mitsubishi flat-square tube with a 13.8-inch active screen size, the F340iW is capable of 1,024-by-768 maximum resolution at a vertical refresh rate of 76 Hz. The F340iW is both Energy Star–compliant (with a third-level mode that draws less than 8 watts) and MPR II–compliant.

On objective tests, the F340iW was not very impressive. Its best result was an above-average maximum usable brightness score of 26.1 foot-lamberts. The monitor turned in average scores on both the modulation transfer function and misconvergence tests, and it produced a slightly worse-than-average score on our pincushioning test. The result was a somewhat disappointing composite score, which was below the average for this roundup.

During our subjective evaluations, however, the F340iW was almost flawless.

CONTINUES

Amax Impression 5	AOC Spectrum Series 4N	AOC Spectrum Series 5S	CTX 1561LR	Darius HRN-14VLP	Darius HRN-15VLP	Digital PCXBV-DE	Digital PCXBV-BC	ETC ViewMagic CA-1464SP	ETC ViewMagic CA-1565SP
$366.00	$359.00	$409.00	$539	$	$495	$	$	$	$
Amax Engineering Corp.	AOC International (USA) Ltd.	AOC International (USA) Ltd.	CTX International Inc.	Darius Technology Ltd.	Darius Technology, Ltd.	Digital Equipment Corp	Digital Equipment Corp	ETC Computer Inc	ETC Computer Inc
3288 Corporate Ct., Fremont, CA 94538	311 Turquoise Frontage Rd., Milpitas, CA 95035	311 Turquoise Frontage Rd., Milpitas, CA 95035	20631 Currier St., Walnut, CA 94789	2 Bumaby, B.C., Canada V5C 6G7	2 Bumaby, B.C., Canada V5C 6G7	4 Stow, MA 01775	4 Stow, MA 01775	2911 Bayview Dr Fremont, CA 94538-6520	2911 Bayview Dr Fremont, CA 94538-6520
800 800 6328	800 228 7744	800 228 7744	800 888 2012	80 663 8631	800 663 8631	800 332 9000	800 332 9000	None	None
510 651 4888	615 833 7742	615 833 7742	909 595 6146	(Canada)	(Canada)	508 494 5111	508 494 5111	510 226 6250	510 226 6250
510-651-4119	615-833-5464	615-833-5464	909-595-6293	206-486-2577 604-654-1881 (Canada)	206-486-2577 604-654-1881 (Canada)	None	None	510-226-6252	510-226-6252
2 years	2 years parts, 1 year labor	2 years parts, 1 year labor	2 years parts, 1 year labor	2 years	2 years	3 years	3 years	2 years	2 years
471	472	473	474	475	476	477	478	479	480
Hitachi	Chung Hwa, Hitachi	Hitachi, NEC	NEC	Hitachi, NEC	Hitachi, Philips	NEC, Toshiba	NEC, Toshiba	Hitachi	Hitachi
13.9	13.3	13.5	14	13.4	13.8	12.6	13.5	12.6	13.5
14.6 x 14.3 x 15	14 x 14 x 14.8	14.8 x 14.5 x 15.5	15.5 x 14.8 x 15.3	14.3 x 14 x 15	13.8 x 13.9 x 15	14.3 x 14 x 14.8	14.3 x 14.8 x 15	12.8 x 14.6 x 15.3	13.5 x 14.5 x 14.8
29	25	32	32	27	30	28	30	27	30
☐	Optional ($30)	Optional ($30)	■	■	■	■	■	■	■
☐☐	■■	☐☐	☐☐	■■	■■	☐☐	☐☐	☐☐	☐☐
110	65	85	85	75	75	70	70	75	75
50–100	50–90	50–90	50–90	50–90	50–90	50–90	50–100	52–120	52–120
30–60	30–50	30–64	30–60	30–60	30–60	30–57	30–58	30–61	30–65
60, 72	N/A, 60	60, 75	N/A, 72	60, 72	60, 72	N/A, 72	N/A, 72	N/A, 76	60, 76
72, 72	75, 75	75, 75	72, 72	72, 72	72, 72	72, 72	72, 72	90, 120	100, 120
90, N/A	85, 19	90, N/A	90, N/A	80, N/A	90, N/A	60, N/A	85, N/A	90, N/A	100, N/A
N/A, N/A	19, 2	N/A, N/A	N/A, N/A	8, 5	8, 5	N/A, N/A	N/A, N/A	N/A, N/A	N/A, N/A
Digital	Analog	Digital	Analog	Analog	Analog	Analog	Analog	Digital	Digital
■	☐	☐	☐	☐	☐	☐	☐	■	■
■■	■	☐☐	☐☐	■	■	☐☐	☐☐	■■	■■
■	☐■	☐■	☐■	☐■	■■	☐■	☐■	■	■

We found that the monitor had a very solid screen image—clearly one of the best in the group. There were no visible misconvergence or pincushioning problems, and the monitor proved to have one of the most stable images during both video-mode switching and screen-power regulation tests.

There was just a bit of bounce when going from partial-screen to full-screen DOS windows at a resolution of 1,024-by-768, but it was not bothersome. Absolutely no bounce was detected when switching from full to partial windows at the same resolution, and none was detected either way at a lower resolution of 800-by-600. Also, the F340iW had minimal screen glare and no screen muddiness.

Nanao F340iW

The variable-frequency Nanao monitor is equipped with a microprocessor and full range of digital user controls. Along with the standard complement of image adjustments, the F340iW includes controls for pincushioning adjustment and trapezoidal adjustment as well as a degaussing button. Also—unique among monitors at any price—the F340iW demonstrated superlative color-matching capabilities and has adjustments for white-point temperature, color gain, and color contrast.

The F340iW did turn in only middling objective test scores. But given its exceptional performance during our subjective analysis and its comprehensive set of digital image-adjustment controls, the F340iW proved itself to be a quality monitor in many respects.

NEC Technologies Inc.

NEC MultiSync 3V
NEC MultiSync 4FGe

BY ALFRED POOR

Both of NEC Technologies' entries have 15-inch flat-square tubes and carry the familiar MultiSync name. Both are rated as MPR II–compliant, and both include Intelligent Power Manager (IPM), which works with your computer's video card to

SUMMARY OF FEATURES

■ 14-inch monitor ■ 15-inch monitor

■ = YES □ = NO

	GoldStar Model 1510	Hyundai XCM-447E	IBM 14P Color Monitor	IBM 15P Color Monitor	KFC CM-1420MD2	KFC CA-1508	Liberty CL-9015	MAG DX15F
Price	$799.95 (list)	$599.00 (list)	$833.00 (list)	$807.00 (list)	$380.00 (list)	$515.00 (list)	$329.00 (list)	$439.00 (list)
Company	GoldStar Technology Inc.	Hyundai Electronics America	IBM Personal Computer Co.	IBM Personal Computer Co.	KFC-USA Corp.	KFC-USA Corp.	Liberty Electronics	MAG InnoVision Inc.
Address	1000 Sylvan Ave., Englewood Cliffs, NJ 07632	166 Baypointe Pkwy., San Jose, CA 95134	Route 100, Somers, NY 10589	Route 100, Somers, NY 10589	1575 Sunflower Ave., Costa Mesa, CA 92626	1575 Sunflower Ave., Costa Mesa, CA 92626	46089 Fremont Blvd., Fremont, CA 94538-6541	2801 S. Yale St., Santa Ana, CA 92704
Toll-free number	None	800-568-0060	800-772-2227	800-772-2227	800-253-2872	800-253-2872	800-745-7011	800-827-3998
Toll number	201-816-2000	408-473-9379	None	None	714-546-0336	714-546-0336	510-623-6000	714-751-2008
Fax number	201-816-2188	408-473-9398	800-426-4329	800-426-4329	714-546-0315	714-546-0315	510-623-7021	714-751-5522
Warranty	1 year; 3 years CRT	18 months	3 years	3 years	1 year	1 year	1 year	1 year; 2 years CRT
Reader service card number	483	484	485	486	487	488	480	490
Tube manufacturer	Hitachi	Samsung	Matsushita	Matsushita	Hitachi, NEC	Hitachi, NEC	Hitachi	Hitachi
Active screen size (diagonal, in inches)	13.6	13.4	13.1	13.8	13	13.9	13.3	14
Dimensions (HWD, in inches)	16 x 14.5 x 16.8	14.3 x 14 x 15	15.8 x 14.4 x 16.3	15.8 x 14.4 x 16.4	12.8 x 13.9 x 14.3	14.3 x 13.9 x 14.3	14.3 x 14.5 x 15	14.1 x 14.3 x 15.8
Weight (pounds)	35	25	30	33	26	30	27	32
MPR-II compliance claimed	□	□	■	■	■	■	■	■
Energy Star–/DPMS-compliant	□□	□□	■■	■■	□□	■■	□□	■■
Operational Features								
Video bandwidth (MHz)	75	65	110	110	80	80	55	80
Vertical scanning frequency (Hz)	50–120	56–87	50–110	51–110	50–90	50–90	50–90	50–100
Horizontal scanning frequency (kHz)	30–60	31.5–56	30–64	31–64	30–60	30–65	30–50	30–64
Maximum noninterlaced refresh rates (Hz):								
1,280 x 1,024; 1,024 x 768	N/A, 72	N/A, 72	60, 76	60, 76	N/A, 70	60, 70	N/A, 60	60, 76
800 x 600; 640 x 480	72, 72	72, 72	72, 76	72, 76	72, 60	72, 73	72, 72	85, 100
Power consumption (watts):								
Maximum, Standby modes	80, N/A	80, N/A	80, 60	80,60	85, N/A	85, N/A	90, N/A	85, N/A
Suspend, Off modes	N/A, N/A	N/A, N/A	24, 4	24, 4	N/A, N/A	20, 2	N/A, N/A	15, 10
Controls								
Type of controls	Digital	Analog	Digital	Digital	Digital	Digital	Digital	Digital
Color matching	□	□	■	■	□	□	□	□
Pincushioning/Trapezoidal adjustment	■■	□□	■■	■■	■□	■■	■□	■□
Manual/automatic degaussing	□■	□■	□■	□■	□■	■■	□■	■■

N/A—Not applicable: The product does not have this feature.

save power. They both come with some of the best manuals in the bunch and a three-year warranty covering parts and labor. And both produce excellent images. They differ, however, in terms of features and price, with the more expensive and feature-rich NEC MultiSync 4FGe earning an Editors' Choice award.

The NEC MultiSync 3V carries a street price of $550, placing it in the lower half of the price range for 15-inch monitors in this roundup. While it has fewer fancy features than its more expensive stablemate, it still represents a low-price choice from a blue-chip source.

The monitor is designed to handle images of 1,024-by-768 resolution—but only at 60 Hz. Most users will likely prefer the VESA-standard 800-by-600 resolution at 72 Hz for a more flicker-free image.

Our subjective evaluation results for this unit ranged from good to excellent. While the image was not quite as crisp as that offered by the best monitors, it was still well above average. There was some clicking when switching between VGA and higher-resolution modes, but the transition was masked by a smooth and fast fade.

As might be expected with its lower price, the MultiSync 3V comes with analog controls, which are conveniently located along the front edge of the case and are well marked. In addition to the usual size, position, brightness, and contrast controls, there is also a pincushioning adjustment.

The combination of good image quality and adequate features at a competitive price makes the MultiSync 3V an attractive option. You might think of it as "the bargain NEC."

At a street price of about $755, the MultiSync 4FGe is priced near the top of the pack, but it is clearly not the most expensive monitor in this review. While this may be a premium price, you get a lot for the money, including an excellent screen and plenty of fancy features.

The monitor is designed to run at higher resolutions than most of the others in its class. It can handle resolutions up to 1,024-by-768 at a 76-Hz refresh rate that will banish flicker.

The MultiSync 4FGe produced some of

NEC MultiSync 4FGe

CONTINUES

	Mitsuba M715VS	Mitsubishi Diamond Scan 15FS	Nanao FlexScan F340iW	NEC MultiSync 3V	NEC MultiSync 4FGe	Nissei Sangyo/ Hitachi SuperScan 15s	Nokia Multigraph 448S	Nokia Multigraph 449E	Optiquest 15000	Orchestra MultiSystems' The Trombone
	$495.00 (list)	$645.00 (list)	$799.00 (list)	$550.00 (street)	$755.00 (street)	$549.00 (list)	$510.00 (list)	$630.00 (list)	$399.00 (street)	$325.00 (list)
	Mitsuba Corp.	Mitsubishi Electronics America Inc.	Nanao USA Corp.	NEC Technologies Inc.	NEC Technologies Inc.	Nissei Sangyo America/Hitachi	Nokia Consumer Electronics	Nokia Consumer Electronics	Optiquest Inc.	Orchestra MultiSystems Inc.
	1925 Wright Ave., La Verne, CA 91750	5665 Plaza Dr., Cypress, CA 90630	23535 Telo Ave., Torrance, CA 90505	1255 Michael Dr., Wood Dale, IL 60191	1255 Michael Dr., Wood Dale, IL 60191	100 Lowder Brook Dr., Westwood, MA 02090	3000 Bridgeway Blvd., Sausalito, CA 94965	3000 Bridgeway Blvd., Sausalito, CA 94965	20490 Business Pkwy., Walnut, CA 91789	3300 W. MacArthur Blvd., Santa Ana, CA 92704
	800-648-7822	800-843-2515	800-800-5202	800-388-8888	800-388-8888	800-441-4832	800-296-6542	800-296-6542	800-843-6784	800-237-9966
	909-392-2000	714-236-6352	310-325-5202	508-264-8000	508-264-8000	617-461-8300	415-331-0322	415-331-0322	909-468-3750	714-708-3400
	909-392-2021	714-236-6172	310-530-1673	708-860-7973	708-860-7973	617-461-8665	415-331-6211	415-331-6211	909-468-3770	714-708-3500
	2 years	3 years	1 year	3 years	3 years	2 years	18 months	18 months	2 years parts, 1 year labor	2 years
	491	492	493	494	495	496	497	498	499	500
	Hitachi	Toshiba	Mitsubishi	NEC	NEC	Hitachi	Toshiba	Toshiba	Matsushita	Hitachi, Samsung
	13.9	13.8	13.8	13.8	13.8	13.8	12.4	13.4	13.1	13.1
	14.5 x 14.3 x 16.5	15 x 14.4 x 14.9	15 x 14.3 x 16.2	15.4 x 14.8 x 16.7	15.5 x 14.6 x 16.3	14 x 14 x 16	13.9 x 13.8 x 13.8	14.5 x 14.5 x 14.8	13.9 x 13.6 x 15.3	13.9 x 13 x 15.6
	30	29	30	30	29	30	27	30	29	29
	■	■	■	■	■	■	■	■	■	□
	□□	□□	■■	■■	■■	■■	■□	■□	■■	□□
	60	60	75	65	80	75	90	90	90	65
	50–90	50–90	55–90	55–90	55–90	50–100	48–100	48–100	50–110	50–90
	30–56	31.5–62	27–61.5	31–50	27–62	30–64	30–62	30–62	30–64	31.5–64
	N/A, 72	N/A, 76	N/A, 76	N/A, 60	N/A, 76	60, 76	N/A, 75	N/A, 75	60, 76	60, 70
	72, 90	90, 90	90, 90	72, 75	76, 75	100, 100	75, 100	75, 100	70, 76	72, 72
	90, N/A	100, N/A	95, 10	100, 70	185, 74	100, 83	110, N/A	110, N/A	100, N/A	120, N/A
	N/A, N/A	N/A, N/A	N/A, 7	30, N/A	30, N/A	10, N/A	30, 8	30, 8	30, 5	N/A, N/A
	Digital	Digital	Digital	Analog	Digital	Digital	Digital	Digital	Digital	Analog
	□	□	■	□	■	□	□	□	□	□
	■□	■□	■■	■□	■□	■■	■□	■□	■□	□□
	■■	□■	■■	■■	■■	■■	□■	□■	□■	□■

the best pincushioning and misconvergence scores of the entire roundup (including even the smaller 14-inch screens). Subjective observations confirmed the objective test scores; the image had a crispness and depth that are hard to find. Switching among 20 different resolutions produced an audible click, but the image change was masked by a fast, smooth fade. If this monitor has a flaw, it is the tendency to cause glare; most users will want to get NEC's light gray glare filter (street price $70).

The monitor comes with digital controls for altering position and size. But the same controls do double duty for color balancing and pincushioning. There are three color settings—one factory-preset and two user-definable. There are also a degaussing button (which is also used to change modes for the digital controls) and analog brightness and contrast controls. The monitor comes with an excellent manual as well, which includes useful information on color theory.

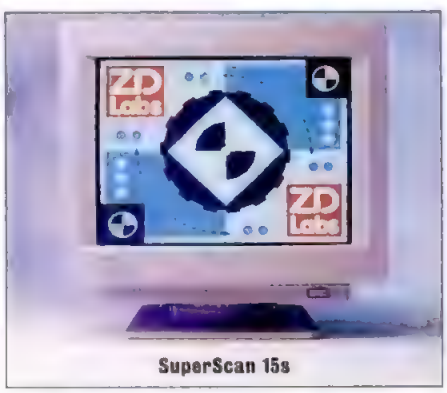
The MultiSync 4FGe is clearly one of the best monitors in this roundup. The controls could be a little easier to use, and the monitor needs a glare filter, but the most important thing is what shows up on the screen, and that's where this one shines. Unless you need to go with a rock-bottom-priced monitor, this Editors' Choice winner should be on the top of your list.

Nissei Sangyo America/Hitachi

SuperScan 15s

BY BRUCE BROWN

Nissei Sangyo America/Hitachi's $549 15-inch SuperScan 15s did not fare well on objective performance tests, with low scores on nearly all of our SuperSpot 100 tests. The one exception was the monitor's slightly better-than-average score on our maximum usable brightness measurement.



SuperScan 15s

The SuperScan 15s has a 15-inch Hitachi flat-square tube with a 13.8-inch active screen size. The monitor's maximum resolution is 1,280-by-1,024 at a vertical refresh rate of 60 Hz. At a lower 1,024-by-768 resolution, the SuperScan 15s was

Samsung
A new point of view.

First impressions are important.
So take a good look at the new SyncMaster™ GL Series monitors. You'll find they're easy on your eyes and even easier on your pocketbook.

Samsung took for granted you wanted bright, crisp clear images that don't flicker. You're also concerned about things like safety and energy conservation, so they're standard on the whole series.

Life should be as hassle-free as possible, so we added some innovative new ideas like On-Screen Display, and as you would expect, each SyncMaster GL Series monitor comes with a two-year warranty.

So look at what it takes to satisfy your monitor needs. Samsung did. And came up with a whole new point of view.

SyncMaster	14GL	15GL	17GL
Size	14"	15"	17"
Dot Pitch	.28	.28	.28
Maximum Resolution	1024 x 768	1024 x 768	1280 x 1024
Maximum Refresh Rate at Maximum Res.(Hz)	76	76	60
MPR-II (Low radiation)	•	•	•
Power Management	•	•	•
Flat Square Screen		•	•
On-Screen Programming			•
Warranty	2 Years	2 Years	2 Years

For more information,

Call 1-800-933-4110.

TECHNOLOGY THAT WORKS FOR LIFE

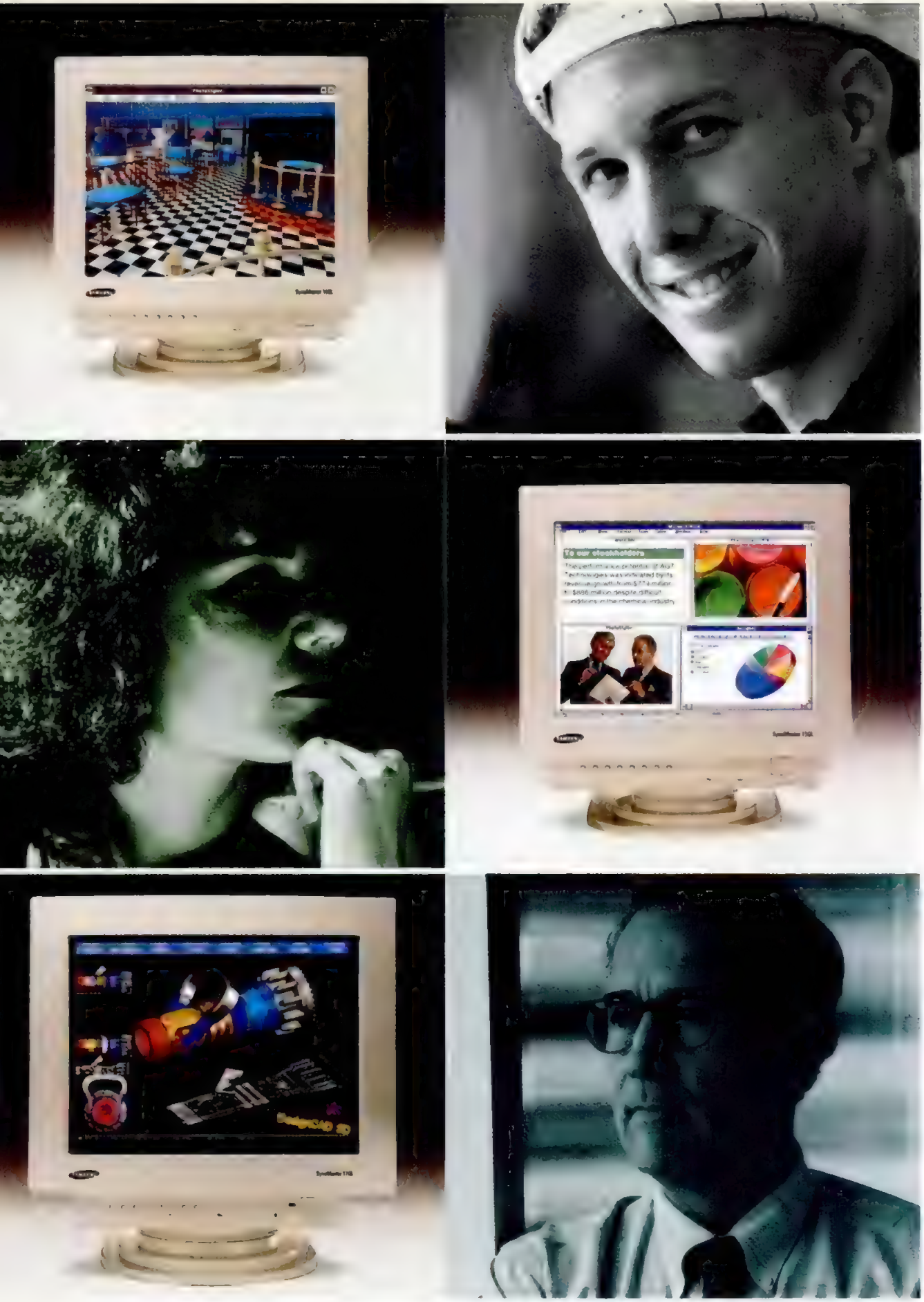
SAMSUNG ELECTRONICS

*1994 Samsung Electronics America Inc. Use of the EPA Energy Star Logo is not to be construed as a product endorsement. Image on SyncMaster 14GL courtesy of Intergraph. Image on SyncMaster 17GL courtesy of American Business.

SyncMaster 14GL

SyncMaster 15GL

SyncMaster 17GL



CIRCLE 046 ON READER SERVICE CARD

Mainstream Monitors

SUMMARY OF FEATURES

■ 14-inch monitor ■ 15-inch monitor

■ = YES □ = NO

	Orchestra MultiSystems The French Horn	Packard Bell PB8549SVGL	Packard Bell PB8515SVGL	Philips Brilliance 15	Relisys RE-1564	Relisys TF-1560	Sampo AlphaScan Plus	Sampo AlphaScan 15
Price	$475.00 (list)	$349.00 (street)	$499.00 (street)	$699.00 (list)	$730.00 (list)	$710.00 (list)	$495.00 (list)	$649.00 (list)
Company	Orchestra MultiSystems Inc.	Packard Bell Electronics Inc.	Packard Bell Electronics Inc.	Philips Consumer Electronics Co.	Relisys	Relisys	Sampo Corp. of America	Sampo Corp. of America
Address	3300 W. MacArthur Blvd., Santa Ana, CA 92704	9425 Canoga Ave., Chatsworth, CA 91311	9425 Canoga Ave., Chatsworth, CA 91311	One Philips Dr., Knoxville, TN 37914-1810	320 S. Milpitas Blvd., Milpitas, CA 95035	320 S. Milpitas Blvd., Milpitas, CA 95035	5550 Peachtree Blvd., Norcross, GA 30071	5550 Peachtree Blvd., Norcross, GA 30071
Toll-free number	800-237-8988	None	None	800-835-3506	800-783-2333	800-783-2333	None	None
Toll number	714-708-3400	818-886-9998	818-886-9998	310-217-1300	408-945-9000	408-945-9000	404-449-6220	404-449-6220
Fax number	714-708-3500	None	None	None	408-945-0587	408-945-0587	404-447-1109	404-447-1109
Warranty	2 years	1 year	1 year	3 years	1 year; 2 years CRT	1 year; 2 years CRT	2 years parts, 1 year labor	2 years parts, 1 year labor
Reader service card number	501	502	503	504	505	506	507	508
Tube manufacturer	Hitachi	Chung Hwa	Hitachi	Toshiba	NEC	Hitachi, Mitsubishi	Toshiba	Toshiba
Active screen size (diagonal, in inches)	13.8	13.1	13.6	13.8	13.9	13.6	12.9	13.3
Dimensions (HWD, in inches)	14.9 x 14.4 x 15.6	15.6 x 14.4 x 15.1	15.3 x 14.5 x 15.5	15 x 14.3 x 15	15.5 x 15 x 16	15 x 14.5 x 15	15 x 14.5 x 15.3	15.6 x 14.6 x 15.4
Weight (pounds)	34	25	29	31	32	32	26	30
MPR-II compliance claimed	■	□	□	■	□	□	Optional ($50–$75)	Optional ($50–$75)
Energy Star–/OPMS-compliant	□□	□□	□□	□□	□□	□□	□□	□□
Operational Features								
Video bandwidth (MHz)	110	65	70	75	75	100	65	80
Vertical scanning frequency (Hz)	50–90	50–90	50–90	50–100	50–100	50–100	50–90	50–90
Horizontal scanning frequency (kHz)	30–66	31.5–48	31.5–56.5	30–58	30–64	30–66	30–62	30–64
Maximum noninterlaced refresh rates (Hz):								
1,280 x 1,024; 1,024 x 768	60, 70	N/A, 60	N/A, 70	N/A, 72	60, 70	60, 70	N/A, 76	60, 76
800 x 600; 640 x 480	72, 72	72, 72	72, 73	90, 100	72, 72	72, 72	72, 72	72, 72
Power consumption (watts):								
Maximum, Standby modes	170, N/A	85, N/A	80, N/A	100, N/A	110, N/A	100, N/A	110, N/A	110, N/A
Suspend, Off modes	N/A, N/A	N/A, N/A	N/A, N/A	N/A, N/A	N/A, N/A	N/A, N/A	N/A, N/A	N/A, N/A
Controls								
Type of controls	Digital	Digital	Digital	Analog	Digital	Analog	Analog	Analog
Color matching	□	□	□	□	□	□	□	□
Pincushioning/Trapezoidal adjustment	□□	□□	■□	□□	■■	□□	□□	■□
Manual/automatic degaussing	■■	□□	□□	□■	□■	□■	□□	□□

N/A—Not applicable: The product does not have this feature.

able to run at a very steady 76-Hz vertical refresh rate, higher than the 70 to 72 Hz typically required for flicker-free viewing.

Our objective testing found the SuperScan 15s to be a poor overall performer. Although the monitor had a slightly above-average maximum usable brightness score of 24 foot-lamberts, its performance on the rest of our tests was well below the average.

The SuperScan 15s had the worst modulation transfer function result in our test group. Also, the monitor placed in the bottom quarter on both our pincushioning and misconvergence tests, with 18.4-mil and 6.6-mil results, respectively. The combination of poor performance results on our objective measurements was evidenced by the SuperScan 15s's composite score, which was fourth from last place. Only the Hyundai HCM-447E, Packard Bell PB8549SVGL, and Relisys RE-1564 had worse composite scores.

During subjective observation, however, the SuperScan 15s managed to fare better. Neither the monitor's misconvergence problems nor its pincushioning (which can be adjusted) were readily observable. Also, while it took a relatively long time for the SuperScan 15s to switch between full and partial DOS windows, no click or bounce accompanied the switch. Screen power regulation tested fine, as did video mode switching. The SuperScan 15s had very little screen glare and no problems with text muddiness. The microprocessor-controlled SuperScan 15s meets MPR II emissions requirements and is Energy Star–compliant, using VESA DPMS signaling standards.

The SuperScan 15s offers a comprehensive array of digital user controls. Along with the standard image adjustments for brightness and contrast, the monitor includes pincushioning and trapezoidal distortion controls on the front of the display.

While it did well in subjective testing and has a nifty set of user controls, the SuperScan 15s does not distinguish itself from the rest of our tested monitors because of its worse-than-average performance on our objective tests.

Nokia Consumer Electronics

Nokia Multigraph 44BS
Nokia Multigraph 449E

Zenith Data Systems

ZDS ZCM-1440-UT
ZDS ZCM-1540-UT

BY JOHN R. QUAIN

Originally made by Nokia Consumer Electronics, the 14- and 15-inch models re-

ENDS

	Sampo AlphaScan 15e	Samtron SC-528UXL	Sceptre CC-615L	Sigma Designs Ergo View 15	Sony CPD-1430	TVM Low Radiation 44+	ViewSonic 15	Wen JK1565 Color Monitor	ZDS ZCM-1440-UT	ZDS ZCM-1540-UT
	$749.00 (list)	$659.00 (list)	$550.00 (list)	$879.00 (list)	$699.95 (list)	$349.00 (list)	$549.00 (list)	$695.00 (list)	$449.00 (list)	$549.00 (list)
	Sampo Corp. of America	Samtron Displays Inc.	Sceptre Technologies Inc.	Sigma Designs Inc.	Sony Electronics Inc.	TVM Professional Monitor Corp.	ViewSonic	Wen Technology Corp.	Zenith Data Systems	Zenith Data Systems
	5550 Peachtree Blvd., Norcross, GA 30071	14251 E. Firestone Blvd., La Mirada, CA 90638	560 S. Melrose St., Placentia, CA 92670	47900 Bayside Pkwy., Fremont, CA 94538	3300 Zanker Rd., San Jose, CA 95134	4260 East Brickell, Ontario, CA 91761	20480 Business Pkwy., Walnut, CA 91789	11 Clearbrook Rd., Elmsford, NY 10523	2150 E. Lake Cook Rd., Buffalo Grove, IL 60089	2150 E. Lake Cook Rd., Buffalo Grove, IL 60089
	None	None	800-788-2878	800-845-8086	800-352-7669	None	800-888-8583	800-377-4936	800-395-8469	800-395-8469
	404-449-8220	310-802-8425	714-579-4153	510-770-0100	408-894-0225	909-988-3368	909-869-7976	914-347-4100	708-808-5000	708-808-5000
	404-447-1109	310-802-8820	714-993-2997	510-770-2640	408-955-5171	909-986-3188	909-869-7958	914-347-4128	800-472-7211, 708-808-4434	800-472-7211, 708-808-4434
	2 years parts, 1 year labor	3 years parts, 2 years labor	2 years parts, 1 year labor	1 year	1 year; 2 years CRT	2 years parts, 1 year labor	3 years parts, 1 year labor	1 year	1 year	1 year
	509	510	511	512	513	514	515	516	517	518
	Toshiba	Samtron	Hitachi	Hitachi	Sony	Hitachi	Matsushita	Hitachi	Toshiba	Toshiba
	14	13.8	13.9	13.6	13.3	13	13.8	12.9	13	13.4
	15.6 x 14.8 x 15.5	14.5 x 14 x 14.5	15.8 x 14.3 x 15	14 x 14 x 17.1	14 x 13.8 x 16.1	14 x 14 x 15	15 x 14.1 x 15.9	14.3 x 14 x 15.3	14 x 14 x 15.3	14.5 x 14.5 x 15.4
	32	30	29	36	30	25	32	30	27	30
	■	■	■	■	■	□	■	Optional ($20)	■	■
	□□	□□	□□	□□	□□	□□	■■	Optional ($20)	■□	■□
	60	100	100	100	60	65	86	80	80	80
	50–80	50–100	50–90	50–120	55–119	50–100	50–80	50–90	48–100	48–100
	30–64	30–64	30–56	30–68	28–58	31.5–48	30–64	29–65	30–62	30–62
	60, 76	60, 75	60, 76	60, 74	N/A, 72	N/A, 60	60, 76	60, 72	N/A, 75	N/A, 75
	72, 72	75, 75	72, 60	100, 120	76, 76	72, 72	90, 90	72, 72	75, 100	75, 100
	120, N/A	90, N/A	85, N/A	110, N/A	160, N/A	110, N/A	120, 96	90, N/A	110, N/A	110, N/A
	N/A, N/A	N/A, N/A	N/A, N/A	N/A, N/A	N/A, N/A	N/A, N/A	20, 4	N/A, N/A	30, 8	30, 8
	Digital	Digital	Digital	Digital	Digital	Analog	Analog	Digital	Digital	Digital
	■	□	□	□	□	□	■	□	□	□
	■□	■■	■■	□□	■■	□□	■□	■□	■□	■□
	□■	■■	■□	□■	□■	□■	□■	□■	□■	□■

viewed here are also sold under the Zenith Data Systems label. Yet the two brands seem to represent different price points: The 14-inch Nokia Multigraph 44BS monitor is $510, while the identical ZDS ZCM-1440-UT is $449. The 15-inch Nokia Multigraph 449E monitor, which is an Editors' Choice, is $630, while the identical ZDS ZCM-1540-UT is $549.

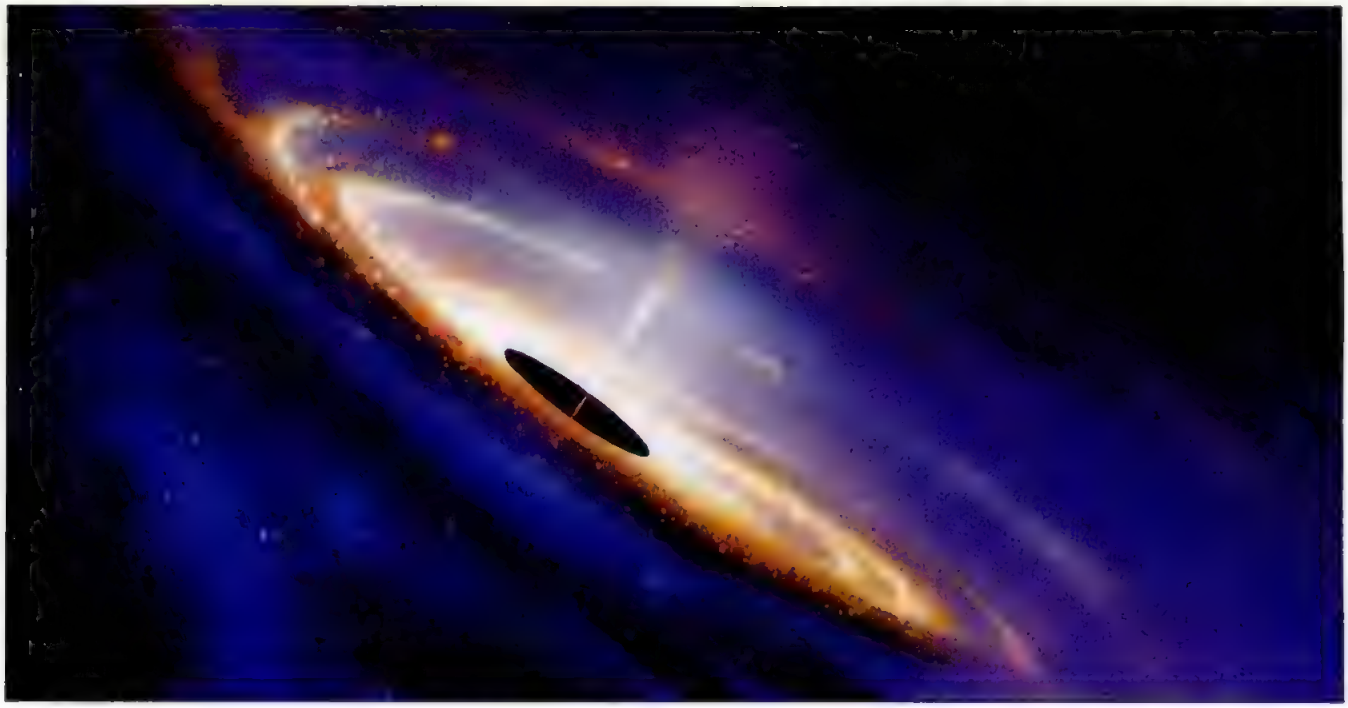
In all other respects, the monitors are nearly identical. With a 0.28-mm dot pitch and maximum noninterlaced resolution of 1,024-by-768, they deliver an eye-pleasing vertical refresh rate of 75 Hz. MPR II low-emission ratings and Energy Star power-saving compliance are also standard. ZD Labs tested the power-saving abilities of the monitors and found that they reduced power consumption to under 4 watts in Suspend mode, way below the Energy Star limit of 30 watts maximum.

Based on conventional curved tubes with minimal antiglare protection, the 14-inch Nokia Multigraph 44BS and ZDS ZCM-1440-UT performed well above the average. But the Nokia unit did better on pincushioning and misconvergence tests, on which the ZDS model lagged behind with worse-than-average scores.

Nokia Multigraph 44BS and ZDS ZCM-1540-UT

During our subjective evaluations, both the Nokia Multigraph 44BS and ZDS ZCM-1440-UT proved impressive at 800-by-600 resolution. The 14-inch displays produced clean, consistent images. In detailed desktop-publishing images, the on-screen fonts looked sharp and in-focus; the spaces between letters remained clean and white. Convergence errors were all but undetectable, and there was virtually no color bleeding or blooming to speak of. Both monitors also managed to switch between video modes quickly and without a hitch.

Even with the resolution bumped up to the highest supported mode—1,024-by-768—the monitors turned in excellent



BLACK HOLE (ARTIST'S CONCEPTION)

"THIS MEETING WAS SUPPOSED TO START A HALF HOUR AGO. WHERE IS EVERYBODY?"

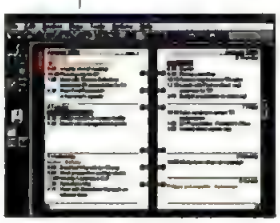
It's a proven fact. Busy schedules and poor communication create black holes

that suck up co-workers just before the big meeting. Scientists can explain a lot about these powerful gravitational fields, but they can't help you get people together on time.

Only Organizer™ can do that. Because now Lotus Organizer™ 1.1 Personal Information Manager for Windows works across your existing ccMail™ network to make scheduling a meeting – as well as planning your day – easier than ever.

You simply choose who you want to attend from the ccMail directory. Organizer shows you a graphical view of their busy and free times so you can pick out the optimal meeting time. Then Organizer delivers an invitation via ccMail. Invitees can accept, decline or delegate to someone else – with a single mouse click. Organizer tracks responses automatically. No searching for missing co-workers. No phone tag. Just the easiest way ever to plan a meeting.

Organizer's group scheduler displays a user's *availability only*, not the entire schedule, so everyone's privacy is protected. And invitations can be sent to anyone on the ccMail network, even if they don't use Organizer.



Lotus Organizer with group scheduling takes the guesswork – and the footwork – out of meeting planning.

Needless to say, Organizer does more than plan meetings. Organizer includes an on-screen calendar, an automated to-do list, an address book, note pad and anniversary reminder – Organizer will even sound an alarm to remind you of a commitment, like that meeting you're invited to.

There are three ways you can get Organizer: on its own, with ccMail in the 10-user group pack, or for an even better deal upgrade to SmartSuite®– a suite of five top-notch, fully integrated business applications, including Organizer– for just $299.* Call **1-800-872-3387, ext. 9411**, or visit your Lotus Authorized Reseller. Because, as common as they are, black holes at work are now entirely preventable.

Lotus
Working Together®

*$299 promotional price while supplies last. In Canada, call **1-800-GO-LOTUS**. Prices may vary. ©1994 Lotus Development Corporation, 55 Cambridge Parkway, Cambridge, MA 02142. All rights reserved. Lotus, SmartSuite and Working Together are registered trademarks and Organizer is a trademark of Lotus Development Corporation. ccMail is a trademark of ccMail, Inc., a wholly-owned subsidiary of Lotus Development Corporation. Windows is a trademark of Microsoft Corporation.

scores. Color registration and image sharpness were hardly affected. By comparison, other monitors in this class looked strained at this resolution.

The 15-inch Nokia Multigraph 449E and ZDS ZCM-1540-UT use the same control panel and attractive chassis design as their siblings do. In addition to the screen size, the main difference between this duo and the 14-inch pair is that the standard cathode ray tube (CRT) used in the smaller models is replaced in the larger models by a flat-square tube, which tends to a more pleasing on-screen image.

Flaunting their exceptional image accuracy and color fidelity, the two 15-inch models in this review received the fourth- and fifth-best composite scores. The monitors' crisp screen images also allowed them to capture the top two positions on our maximum usable brightness test. Their performance on the rest of our objective tests were above average; the only blemish was the ZDS ZCM-1540-UT's less-than-stellar misconvergence score. In fact, the ZDS ZCM-1540-UT's below-average misconvergence score kept it from being given one of our Editors' Choice awards.

In subjective evaluations, these two 15-inch monitors continued to perform impressively in 800-by-600 mode. Neither unit demonstrated any hint of pincushioning distortion, colors were fully saturated, and small fonts remained sharp and clear. You would have to search hard to find fault with either monitor in this mode.

Bumping them up to their maximum 1,024-by-768 resolutions produced only minor image problems. Generally, the images remained solid and sharp, with just a little misconvergence beginning to show in the lower-left-hand corner of each screen.

The superior performance of the Nokia-built monitors makes them a bargain. The company has paid more attention to detail than most companies with monitors of this size do. Nokia covers its own monitors with an 18-month warranty, while Zenith provides one year of coverage.

Optiquest Inc.

EDITORS' CHOICE Optiquest 1500D

BY BRUCE BROWN

The 14-inch Optiquest 1500D was one of the best monitors we tested in this roundup. The 1500D turned in good scores on all our objective tests, and these results were backed by positive subjective evaluations. With an aggressive street price of $399, the 1500D is an excellent bargain that earned one of our Editors' Choice awards.

Optiquest 1500D

Optiquest uses a 14-inch-diagonal curved Matsushita tube in the 1500D. The monitor has a 13.1-inch viewable screen size and supports a maximum resolution of 1,280-by-1,024 at a vertical refresh rate of 60 Hz. The 1500D's 1,024-by-768 resolution at a refresh rate of 76 Hz, however, is better suited for the monitor's size.

On our objective tests, the 1500D proved itself to be one of the better monitors in this roundup. The monitor turned in better-than-average scores except on the modulation transfer function test, where its score was slightly below the average.

The 1500D turned in the seventh-best composite score. Equally impressive were the monitor's scores on our misconvergence and pincushioning tests, where it finished in the top ten of our test group. The 1500D's maximum usable brightness score was also one of the best ones we saw (the monitor placed fourteenth overall).

Our subjective evaluations proved consistent with the 1500D's objective test results. We found no misconvergence or pincushioning visible in any tested video mode, and the monitor had only minimal screen glare and muddiness. Though the 1500D's window switching was fairly slow, it remained totally stable in each tested video mode during both full-screen and partial-screen DOS window switching.

Optiquest uses a microprocessor controller on the 1500D as well as digitally controlled flush-membrane user-adjustment buttons. The standard complement of image controls are included, as is a control for pincushioning adjustment.

The 1500D is MPR II–compliant, and it meets Energy Star requirements by supporting the VESA DPMS signaling standard. The 1500D employs a two-color LED to indicate the monitor's current power-consumption level. The LED switches from green to orange when the monitor enters its power-saving modes.

Regardless of price, the Optiquest 1500D would be a fine performer. Given that the 1500D is available for a low price of $399, this Editors' Choice award–winning monitor is an excellent buy and very hard to pass up.

Orchestra MultiSystems Inc.

The Trombone
The French Horn

BY BRUCE BROWN

The Trombone—Orchestra MultiSystems' $325 14-inch monitor—was a relatively poor performer. The French Horn—the same company's $475 15-inch monitor—turned in only average scores.

The Trombone is a variable-frequency

The Trombone

monitor that is nonmicroprocessor-controlled and has only the usual analog user controls. Also, The Trombone is neither MPR II– nor Energy Star–compliant. It uses either a 14-inch Samsung or a Hitachi curved tube with a 13.1-inch active screen size. The monitor's 1,280-by-1,024 maximum resolution ran fine at a vertical refresh rate of 60 Hz, and the image was rock-solid at 1,024-by-768 at 76 Hz.

On the whole, The Trombone's performance, however, was disappointing. Its misconvergence test score was average. The monitor's maximum usable brightness and modulation transfer function scores were below average, and pincushioning was bad at all resolutions.

Our subjective analysis supported the objective test results. The Trombone had no visible misconvergence, but pincushioning was visible—and especially bad when the monitor ran at a resolution of 800-by-600. Unfortunately, The Trombone lacks a pincushioning adjustment control, which means users would have to live with this unacceptable performance.

Screen glare is only minimal on The Trombone, and image muddiness is not a problem. There were, however, noticeable bounce and odd images on the screen during DOS partial-screen and full-screen window switches.

Though noticeably better than its smaller mate, The French Horn was still only an average performer. Its 15-inch Hitachi flat-square tube has a 13.8-inch active screen size and supports a maximum resolution of 1,280-by-1,024 at a refresh rate of 60 Hz. The monitor is controlled by a microprocessor and is MPR II–compliant, though it does not meet Energy Star power-conservation requirements. User controls are digital, and there is a degaussing button.

The French Horn had misconvergence and maximum usable brightness scores that were slightly worse than average, but its modulation transfer function score was average, and its pincushioning performance was a bit better than average.

During our subjective examination of The French Horn, we found no visible misconvergence or pincushioning. The display, however, was off a bit trapezoidally—a little wider at its bottom. The French Horn offers no way to adjust for this problem. Overall screen glare was not bad, although the image was a little muddy.

Orchestra MultiSystems' 15-inch French Horn wasn't a top-scoring monitor, but it did perform reasonably well for its price. The less expensive, smaller, and less feature-rich 14-inch Trombone, however, leaves much to be desired.

Packard Bell Electronics Inc.

Packard Bell PB8549SVGL
Packard Bell PB8515SVGL

BY BRUCE BROWN

Neither of the monitors from Packard Bell Electronics did well either on objective tests or in subjective testing. The 14-inch Packard Bell PB8549SVGL (street price $349) was the worst overall performer in this roundup. The 15-inch Packard Bell PB8515SVGL (street price $499) performed better than its mate but was still

TI's patented BatteryPro™ System gives you three to five hours* of color computing.

At Texas Instruments, we listened to your travel needs. That's why we built two performance features into every TravelMate™ 4000E notebook computer.

One is the powerhouse 486 processor that helps make your applications scream. The other is our breakthrough BatteryPro power management system. This patented system monitors and maintains low power to various system resources such as the display, hard disk drive and ports until these devices are needed. Walk away for a while and BatteryPro puts your TravelMate

anywhere in between, you've got the power.

to "sleep." Once you return and hit any key, you're right where you left off.

With the TravelMate's advanced power management features, even when you need to fly you won't feel grounded.

TEXAS INSTRUMENTS

*Battery life measured by PC Magazine's Battery Rundown Test. Actual results may vary

well below average. Neither monitor is MPR II– or Energy Star–compliant.

The Packard Bell PB8549SVGL is a variable-frequency monitor that has a 14-inch tube and a 13.1-inch active screen size. Its maximum 1,024-by-768 resolution is limited to a 60-Hz vertical refresh rate. The unit lacks microprocessor control but uses both digital and analog user controls.

The PB8549SVGL's modulation transfer function score was slightly below average, and its maximum usable brightness, misconvergence, and pincushioning scores were all very poor. Subjective evaluation backed up these test scores. Misconvergence was quite visible, especially with the red register in the upper-right corner of the screen. Pincushioning was also visibly bad, particularly in the lower corners of the image.

Packard Bell PB8549SVGL

When toggling between partial- and full-screen DOS windows, the PB8549-SVGL's screen bounced a lot, with odd images showing up before it settled. The monitor does not have autosizing, so it requires a good deal of readjustment when you switch display modes.

The PB8515SVGL is a better monitor than its smaller sibling, but it is still a poor performer. The PB8515SVGL's 15-inch flat-square tube has a 13.6 active screen size, and its maximum 1,024-by-768 resolution supports a 70-Hz vertical refresh rate.

The variable-frequency PB8515SVGL is microprocessor-controlled and has 12 mode settings, 9 of which can be set by the user. There are both digital and analog user controls, including a pincushioning control.

On objective tests, the PB8515SVGL's maximum brightness and misconvergence scores were poor, while its modulation transfer function score was a bit below average. The monitor did, however, manage a better-than-average pincushioning score. While the misconvergence problem was visible in subjective testing, pincushioning was not.

Shifting between full- and partial-screen DOS windows took a bit of time, but this monitor presented no bounce, noise, or remnants.

Of the two Packard Bell units, the 15-inch PB8515SVGL was the better performer, but both monitors were significantly below average compared with the other tested units.

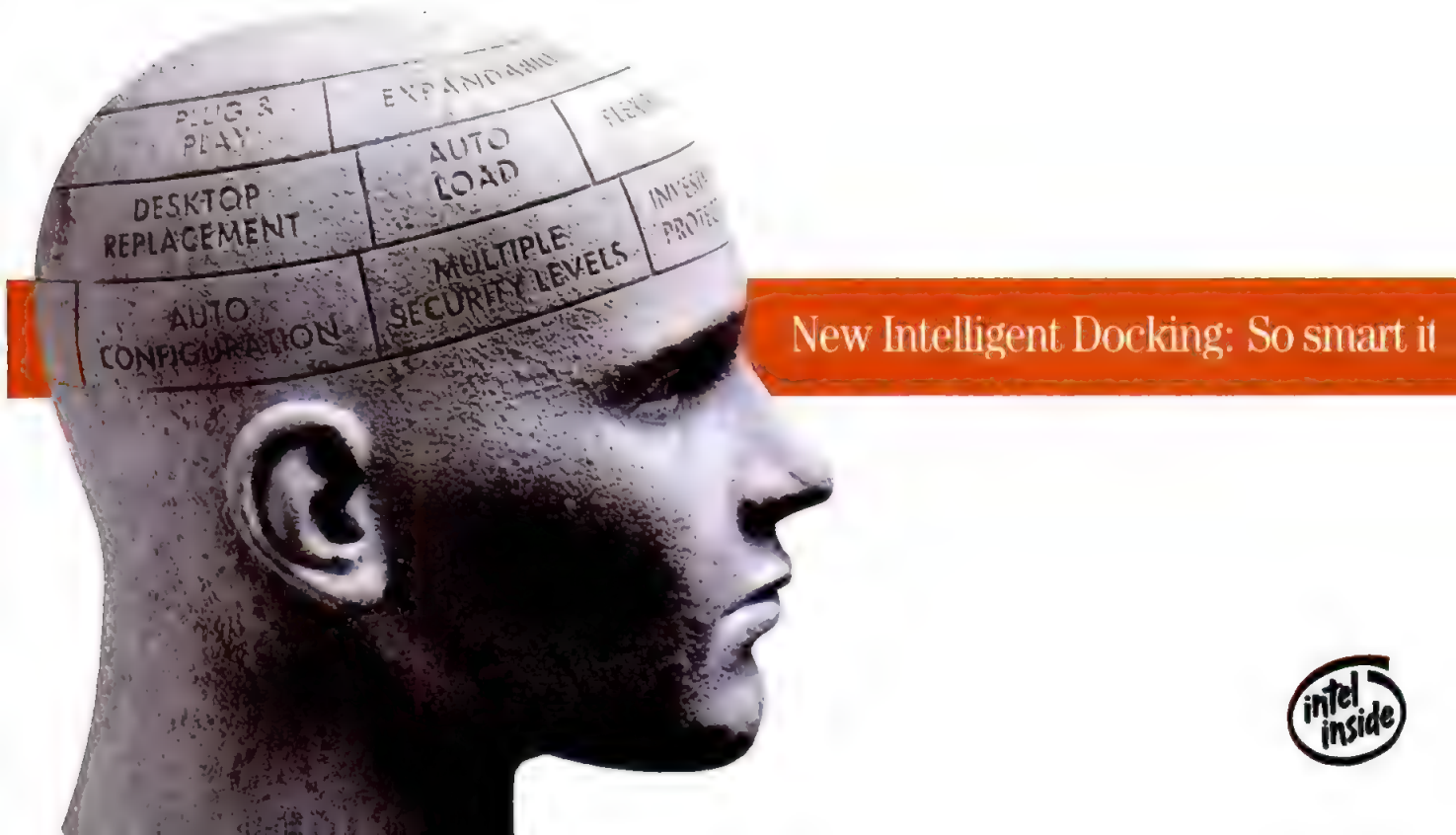
Philips Consumer Electronics Co.

Philips Brilliance 15

BY JOHN R. QUAIN

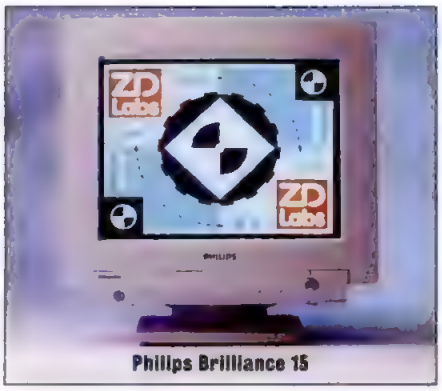
Despite its rather steep $699 price, the Philips Brilliance 15 is an attractive monitor that couples sound capabilities with video.

The Brilliance 15 is based on a 15-inch 0.28-mm-dot-pitch flat-square tube that is



capable of a maximum resolution of 1,024-by-768 with a 72-Hz vertical refresh rate. It complies with the MPR II low-emissions standard, though it doesn't meet Energy Star power-conservation requirements. The monitor's sound capabilities mean that it's ready to be used with multimedia applications.

Two stereo speakers are concealed within the Brilliance 15's attractive chassis, and a front-panel mini-jack with volume control accommodates headphones for private listening. In back, there are two stereo RCA-style audio input jacks for connecting the monitor to a PC's sound board. In giving this monitor audio capabilities, Philips has made a few sacrifices. The monitor does not have any power-saving features, and it uses standard analog display controls. All the image-adjustment dials are lined up on the front panel, but there is no microprocessor to store settings; further, the monitor has neither a pincushioning nor a trapezoidal distortion control.



Philips Brilliance 15

Objective tests conducted in 800-by-600 mode did not particularly distinguish the Brilliance 15 from the other monitors in this roundup. Although scores on both our modulation transfer function test and our pincushioning test were about average and misconvergence was only slightly worse than average, the monitor did suffer from below-average brightness. Even though the antiglare treatment on this monitor is minimal, we were unable to get a bright image without making black backgrounds look gray.

Subjective evaluation of the Brilliance 15's audio capabilities demonstrated that the monitor is sufficient for common business audio uses but unsatisfactory for professional multimedia presentations or for playing back high-fidelity sound. The Brilliance 15's internal speakers lack the bass response for such tasks, and although they provide enough volume to fill a cubicle, when the volume is pushed higher there is some noticeable distortion. Still, the arrangement is fine for corporate environments in which convenience is more a priority than audio fidelity.

For a tightly integrated package where desktop-quality speakers aren't practical and a high-resolution graphics display isn't necessary, the Philips Brilliance 15 represents a reasonable compromise.

Relisys

Relisys RE-1564

Relisys TF-1560

BY BRUCE BROWN

The two reviewed Relysis monitors differed in terms of their tube manufacturers, features, and performance. The less feature-rich Relysis TF-1560 ($710) was a

An industry first from Texas Instruments: Automatic load and system configuration.

We call it the ultimate desktop replacement. You'll call it remarkable. It's our new TravelMate™ Intelligent Docking System+. And by listening to the needs of notebook users, we've created the industry's most advanced docking system available. It's also the most complete.

Just insert any TI TravelMate 4000E notebook computer into the auto-loading mechanism, push a button, sit back and watch the docking system do the rest. Expansion is a snap too, with six ISA and two PCMCIA card slots and four drive bays.

knows if your TI notebook is coming or going.

Our Intelligent Docking System makes the transition from notebook to desktop replacement fast and easy. When you dock, it knows whether you have an external monitor, keyboard or internal modem. Meaning you don't have to reconfigure each time you insert your TravelMate. When you're ready to hit the road, simply click an icon and the system knows to save the file you're working on, close Windows™ and eject your TravelMate. Then away you go. That's true desktop replacement. From the one notebook company who listens.

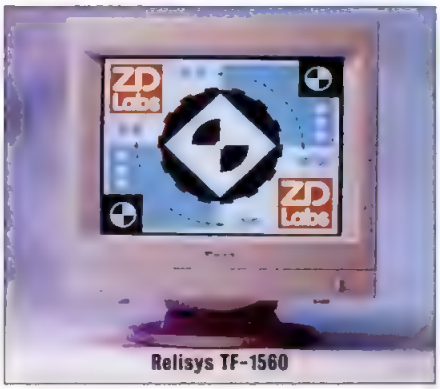
TEXAS INSTRUMENTS

*Color monitor shown above not included with Intelligent Docking System

far better performer than the $730 Relysis RE-1564.

Both Relysis models have 15-inch flat-square tubes with identical capabilities of 1,024-by-768 resolution at 70 Hz and 1,280-by-1,024 maximum resolution at 60 Hz. Neither monitor is MPR II– or Energy Star–compliant, but both control screen glare well, and each demonstrated little screen muddiness.

The TF-1560 is the Relysis 15-inch monitor to buy. A monitor that displayed above-average performance, the TF-1560 uses a 15-inch Hitachi or Mitsubishi flat-square tube (depending on availability), with a 13.6-inch active screen size. While it lacks a microprocessor and has a limited set of typical analog-only user controls, performance is what counts, and this model delivers.



Relisys TF-1560

On objective tests, the TF-1560 turned in above-average scores on both our maximum usable brightness and modulation transfer function tests. Its misconvergence score was worse than average, its pincushioning score was better than average, and no pincushioning effect was visible. There was quite a bit of bounce in regulation testing and in text-to-graphics mode switching, but otherwise the TF-1560 worked well. Considering both objective tests and subjective evaluations, this monitor is noticeably above average.

The slightly more expensive Relysis RE-1564, unfortunately, was a poor performer on all but the brightness test. Built around a NEC 15-inch flat-square tube with a 13.9-inch active screen size, the RE-1564 is microprocessor-controlled and has digital user controls, including convenient pincushioning and trapezoidal-adjustment controls.

The RE-1564's maximum usable brightness score was average, but its modulation transfer function score was the second-worst in this roundup. Also miserable was the misconvergence score, which was dead last. Our pincushioning test yielded a slightly worse-than-average score.

No pincushioning was visible during subjective examination, but the misconvergence problem was very noticeable, particularly in the upper-right corner. Mode switching and screen regulation, however, were very good, but the extreme misconvergence problem suggests that you might want to look elsewhere.

The two 15-inch Relysis monitors carry about the same list price. That, however, is where their similarities end. The difference between them is clear. The TF-1560 is worth the price premium because of its good performance and simple operation, while the RE-1564 is not recommended, despite its microprocessor and digital controls.

Sampo Corp. of America

Sampo AlphaScan Plus
Sampo AlphaScan 15
Sampo AlphaScan 15e

BY ALFRED POOR

The 14-inch Sampo AlphaScan Plus ($495) and the 15-inch Sampo AlphaScan 15 ($649) have analog controls. The Sampo AlphaScan 15e ($749), also a 15-inch monitor, has digital controls. All three monitors use conventional display tubes instead of flat-square designs.

The AlphaScan Plus is the smallest of the three, and it is capable of handling a 1,024-by-768 image at 76 Hz noninterlaced. While its price is higher than that of many of the other 14-inch monitors in this review, its performance was below average.

The AlphaScan Plus received a worse-than-average score on our misconvergence test, and its pincushioning score was one of the worst. These results were supported by our subjective evaluations; we found that this monitor's image was fuzzier than that of others in the group.

The monitor's maximum usable brightness score of 20.5 foot-lamberts was acceptable, but you may need to crank the unit up all the way in brightly lit environments. The AlphaScan Plus's image was stable when switching between VGA and high-resolution graphical modes.

Sampo AlphaScan 15e and AlphaScan Plus

The AlphaScan Plus has no unusual or notable features, such as a low emissions rating or special controls, and while it is far from the worst 14-inch monitor in this roundup, there are others that offer better price and performance.

The AlphaScan 15 can handle 1,024-by-768 resolution at refresh rates of up to 76 Hz and 1,280-by-1,024 resolution at 60 Hz. Its image is sharp and vivid, an observation that was supported by its scores on our lab tests. Also, this monitor's misconvergence and pincushioning scores were distinctly better than average. We did, however, find that the monitor's image would break up and that there was considerable bounce when switching among resolutions.

Like the AlphaScan Plus, the AlphaScan 15 does not include any flashy features, but it does offer good image quality and solid performance.

The AlphaScan 15e, one of the more

The most comprehensive line of 486 notebooks designed specifically to meet your needs.

When it comes to listening to your notebook computer needs, at Texas Instruments we hear what you're saying. And it shows in our line of TravelMate 4000E Series notebooks. After all, we offer a wide range of 486-based notebooks plus an Intelligent Docking System with your needs in mind.

You'll find the entire high-performance lineup, from our economical monochrome WinSX/25™ to our active matrix color WinDX2/50™ powerhouse, is ideal for portable and desktop replacement needs. The critics agree. To start with, Texas Instruments notebooks are the only products in any category ever to win five *PC Magazine* Editor's Choice Awards all in a single issue.* And that's just the beginning.

But, there's really only one way you can find out if a TravelMate 4000E is right for you. Try one!

We're delivering.

TRAVELMATE 4000E SERIES NOTEBOOKS

DISPLAY	PROCESSOR	MEMORY†	PRICE††
Active Matrix Color	486DX2-50MHz	4MB RAM/200MB HDD	$3,999
Dual Scan Color	486DX2-50MHz	4MB RAM/200MB HDD	$3,499
Color	486DX2-40MHz	4MB RAM/200MB HDD	$2,999
Color	486SX-25MHz	4MB RAM/120MB HDD	$2,249
Monochrome	486DX2-50MHz	4MB RAM/200MB HDD	$2,899
Monochrome	486SX-25MHz	4MB RAM/120MB HDD	$1,899

TRAVELMATE INTELLIGENT DOCKING SYSTEM

COMPATIBILITY	EXPANSION	INTERFACES	PRICE††
TI TM4000E Series Notebooks	Six 16-bit ISA slots, two PCMCIA Type III slots, four drive bays	Parallel/2 Serial, VGA, Mouse, keyboard and game ports, RJ-11 jack	$849

† RAM expandable to 20MB with optional memory. †† Estimated street price. Dealer prices may vary

* Two Editor's Choice Awards in August 1993 issue of *PC Magazine*

TravelMate, WinDX2, WinDX, WinSX, BatteryPro and "Extending Your Reach With Innovation" are trademarks of Texas Instruments. The Ready-to-Run logo and Windows are trademarks of Microsoft Corporation. The Intel Inside logo is a trademark of Intel Corp. © 1994 TI

Then decide if indeed we have been listening. Learning. And delivering. Simply call **1-800-527-3500** to find the TravelMate dealer nearest you.

EXTENDING YOUR REACH WITH INNOVATION™

TEXAS INSTRUMENTS

CIRCLE 353 ON READER SERVICE CARD

expensive monitors we tested, had mixed performance results. It can handle up to 1,280-by-1,024 resolution at 60 Hz and manages a flicker-free 76 Hz at 1,024-by-768 resolution.

The monitor scored among the best on our pincushioning test but was worse than average on our misconvergence test. In terms of the monitor's maximum usable brightness, the score was almost exactly average at 22.2 fL, but the AlphaScan 15e should be adequate in bright environments if turned all the way up.

Subjectively, this monitor's image was about average in terms of sharpness, though vertical lines were noticeably thinner and dimmer than horizontal lines.

The AlphaScan 15e is clearly a stronger product than its two companions in the Sampo line, but it still falls behind the leaders. Its picture quality is not as good, and it is not priced at a point that makes it a compelling value.

Samtron Displays Inc.

Samtron SC-528UXL

BY DON CRABB

The 15-inch Samtron SC-528UXL (list price $659) from Samtron Displays is a

Samtron SC-528UXL

multifrequency autosyncing monitor with analog brightness and contrast controls and digital image controls. This monitor is essentially a 15-inch version of Samtron's 14-inch SC-428UX monitor.

The SC-528UXL uses a 15-inch tube that has a 13.8-inch active screen size. The monitor's shadow mask supported a maximum resolution of 1,280-by-1,024 at a refresh rate of 60 Hz. It also handled the more reasonable 1,024-by-780 resolution nicely with a refresh rate of 70 Hz, and the image was easy on the eyes.

During our tests, the SC-528UXL provided a very sharp and clean image. The monitor was clear at all resolutions and had few real defects. At a resolution of 1,024-by-768, the image did not bow when we were switching between Windows and full-screen DOS, and screen bounce during this exercise was minimal.

The SC-528UXL did well in SuperSpot 100 testing, although it was not the leader on any particular test. Its composite score was in the best quarter of scores for this roundup, and it nearly topped all other scores on the modulation transfer function test; only the IBM 15P Color Monitor turned in a better score. Also, this monitor's score was in the best third on our misconvergence test, but it fell to the worst third on our pincushioning test.

The SC-528UXL also did well on our subjective evaluations. While we did notice some pincushioning and misconvergence, neither was distracting. The monitor's case is nothing to get excited about aesthetically, but it is well assembled.

The SC-528UXL includes a captiv video cable sporting miniDB-15 connectors on both ends, making for connections a bit less convenient than those of monitors with detachable video cables. The monitor's image-adjustment controls include pincushioning and trapezoidal controls, but there is no control for color matching. Also, like most of the monitors we tested, the SC-528UXL lacks convergence controls. Our test unit lacked a manual, coming only with a useless spec sheet.

The SC-528UXL we received for our review was an early production unit that did not have any power-down capabilities, although it did comply with MPR II emissions standards. According to Samtron, a version of the SC-528UXL that will be MPR II–compliant and will meet Energy Star power-conservation requirements will be shipping shortly.

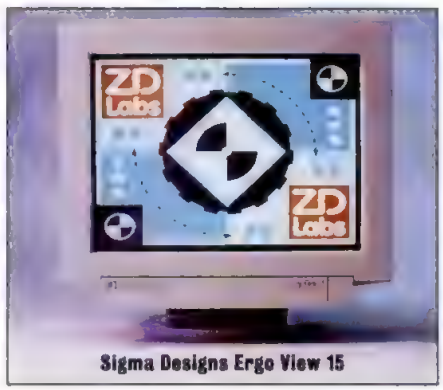
On the whole, the Samtron SC-528UXL's image was good and its scores were solid, making it a good value for a 15-inch monitor.

Sigma Designs Inc.

Sigma Designs Ergo View 15

BY DON CRABB

The expensive $839 Sigma Designs Ergo View 15 is a 15-inch multifrequency autosyncing monitor with analog brightness and contrast controls and digital image adjustments.



Sigma Designs Ergo View 15

The Ergo View 15 uses a 15-inch Hitachi tube with a 13.6-inch active screen size. The monitor supports a maximum noninterlaced resolution of 1,280-by-1,024 at a refresh rate of 60 Hz. It also handled the more reasonable 1,024-by-780 resolution with a decent refresh rate of 70 Hz. In this video mode, the image remained solid.

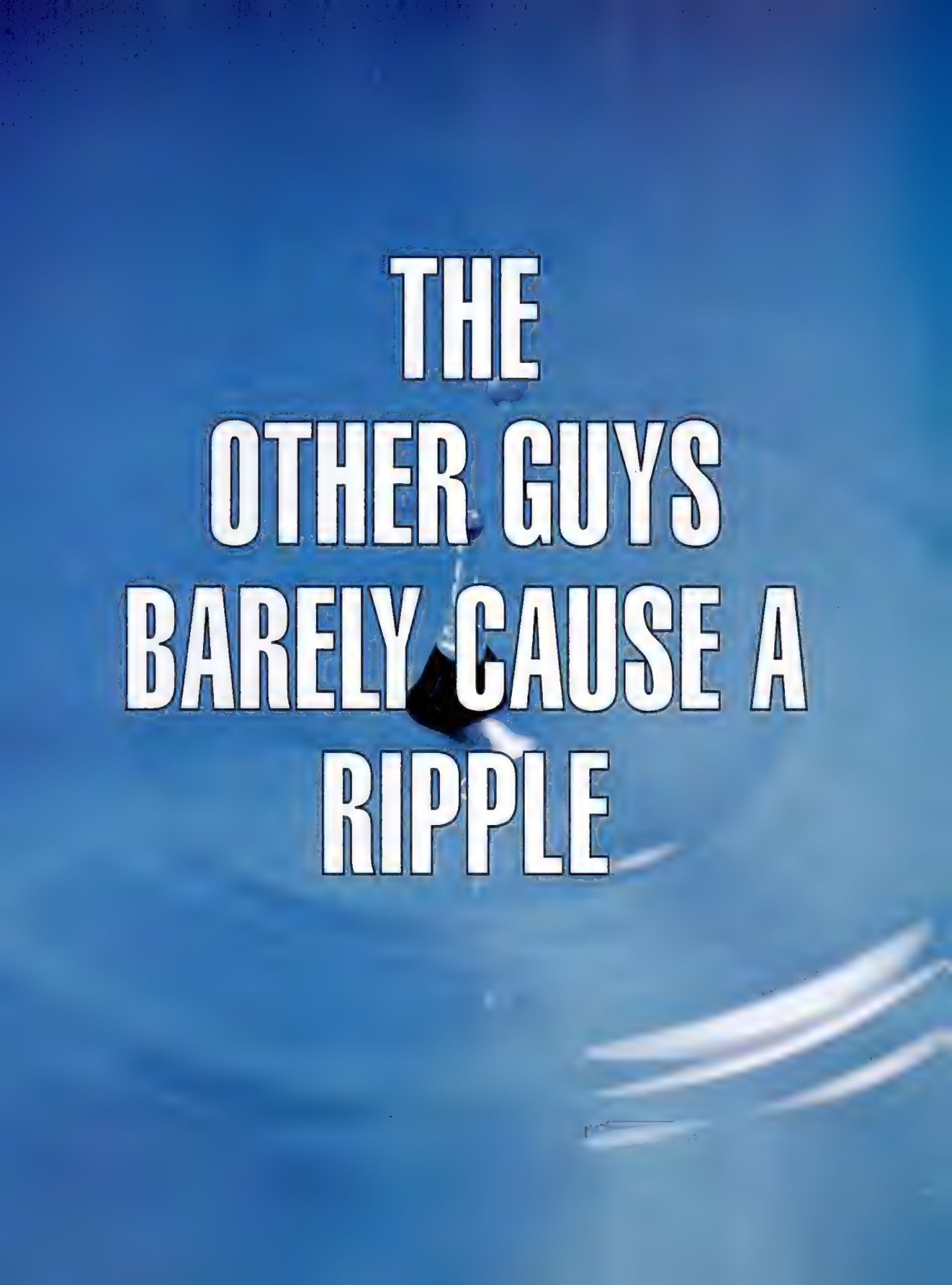
The Ergo View 15 meets the emissions requirements to qualify for MPR II compliance, but the monitor does not follow VESA's DPMS signaling specification and doesn't qualify for Energy Star power-conservation status.

During our tests, the Ergo View 15 provided a decent if lackluster image; it was clear at all resolutions, with few real defects, but it did not pop off the screen at us. At a resolution of 1,024-by-768, the image bowed slightly when switching between Windows and full-screen DOS, but screen bounce was minimal.

The Ergo View 15 turned in average scores on our objective tests. Its composite score was only one place above the average. The Ergo View 15's modulation transfer function test score of 45 percent landed in the upper quarter of the scores on that test. The monitor's maximum usable brightness score of 21.6 foot lamberts was below average.

The Ergo View 15 fell to the worst third with its misconvergence score of 5.9 mils, but it wound up in the better half with its pincushioning test score of 12.2 mils.

During our subjective examinations, we noted some pincushioning, but it was not distracting. We also noted some misconvergence, although it was not severe.


THE
OTHER GUYS
BARELY CAUSE A
RIPPLE

Catch Our Wave!

You'll make a big splash at your next presentation. And the next time you return to the office with your work already finished. Because with the new CompuAdd 450 Colorpro, you'll be riding the crest of the latest in notebook technology — with power and features that make competing portables look all wet.

With the 450 Colorpro, you'll ride the Windows wave, with an active matrix color display, big 340MB hard drive and fast 50MHz Intel 486DX2 processor. You ride the ease-of-use wave, with a built-in trackball that's centered for both left- and right-handed users. And you'll ride the business presentation wave, with a port for a big external video, built-in audio and jacks for external speakers.

The 450 Colorpro, in fact, is drenched with features:

- 9.5" Active Matrix Color Display
- Intel 486DX2/50MHz Processor
- 340MB Hard Drive; 3.5" Floppy
- Two Type 2 or One Type 3 PCMCIA
- 4MB RAM, Expandable to 20MB
- Built-in Mouse Trackball, Centered
- Built-in Microphone and Speaker with Speaker Jacks
- Business Audio
- External VGA and Keyboard Ports
- 6.5 Pounds Including Battery
- Free MS DOS 6.2, Windows for Workgroups 3.11, Close-Up 4.0, CompuServe Starter Kit, AMIDiag Lite, A/C Adapter, Carrying Case

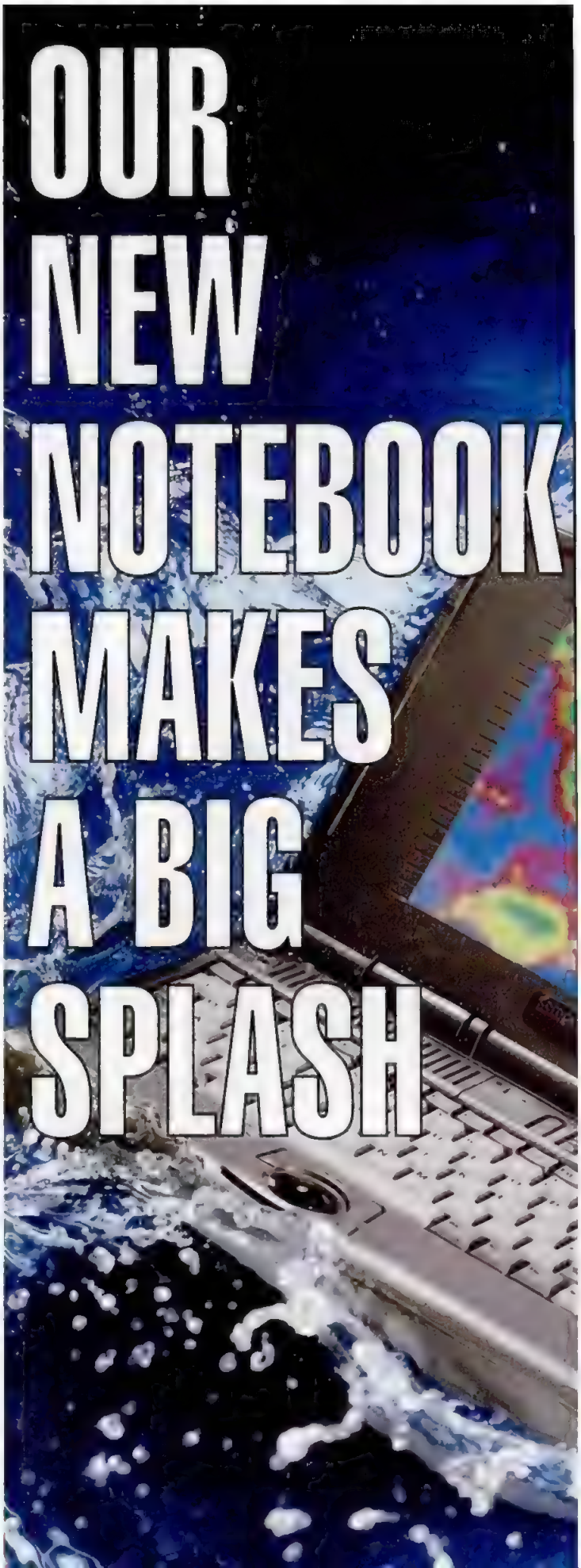
And after you buy, we won't leave you high and dry, either. Because our Risk Free Guarantee is designed to keep you from being swamped by any wave.

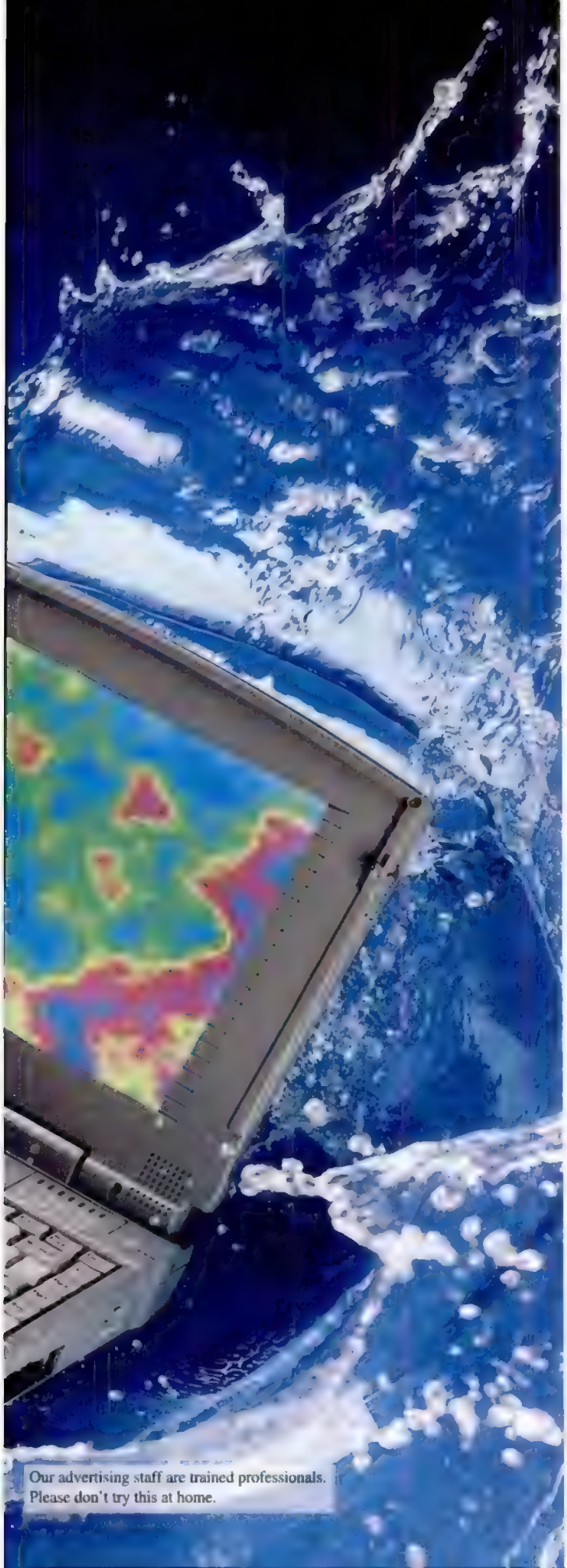
CompuAdd 450 Colorpro

$3,995

Lease for only $139/mo.

intel inside





CompuAdd's Risk Free Guarantee Keeps You Afloat

30-Day Money-Back Guarantee
We're so sure you'll be satisfied with your new CompuAdd system that if you must return it within the first 30 days, we'll refund your purchase price.

Free Insurance
Your system is covered against theft and damage, even power surges, for 30 days FREE. You can purchase additional coverage from Safeware for pennies a day for most systems.

Remote Rescue Online Support
Using Close-Up 4.0, our technicians can access your system via modem and correct setup and configuration problems online— instead of relaying instructions for you to do it yourself.

Lifetime Technical Support
Our expert technical support staff will provide free telephone assistance for as long as you own your system.

One-Year Onsite Service on Desktops
During the first year, if you have a problem with your desktop system that our technicians can't solve on the phone, we'll ship replacement parts and dispatch an onsite technician. Free!

30-Day Price Protection
If we lower the advertised price of your new system within 30 days of your purchase, we'll refund the price difference.

One-Year Limited Warranty
If you have to ship your system in, we'll make repairs or replace defective parts in our factory without charge during the first year.

Lifetime BBS Support
You'll have access to our free technical bulletin board for as long as you own your system.

Out-Of-Warranty Repairs
We're here to support you even after your warranty expires. You can extend your desktop's onsite service option for a second or third year, purchase spare desktop parts or send in your system for factory repairs.

Onsite Installation Option
Our technicians can help you set up your desktop computers— from a standalone unit in your home to a multi-node network at your business. We'll even plan your network.

Environmentally Sensitive Packaging
The bezels on CompuAdd desktop systems are made from a recyclable plastic, and desktop shipping boxes are plain brown, unbleached cardboard. We pack with a new, low-density polyethylene foam that reduces waste.

CompuAdd
CUSTOMER DRIVEN. BY DESIGN.

800-289-9888

12303 Technology Blvd., Austin, Texas 78727
Hours: 7am-7pm (CST) M-F 512-250-2930 Fax 512-331-2862

©CompuAdd Corporation 1994. Prices and specifications are subject to change without notice. CompuAdd is not liable for damage due to omissions or typographical errors. The Intel Inside® logo is a registered trademark of Intel Corporation. Safeware, Close-Up, Microsoft and all other brands and product names are trademarks or registered trademarks of their respective companies.

CIRCLE 126 ON READER SERVICE CARD

The Ergo View 15 includes a captive video cable sporting miniDB-15 connectors on both ends, making for connections a bit less convenient than those of monitors with detachable video cables. The monitor was well assembled, but we had trouble with the control layout, because the switches were difficult to actuate. Our test unit's manual was one of the best we read.

The Ergo View 15 comes with a standard complement of image adjustments—including pincushioning controls but not keystoning or color controls. Unfortunately, all of the monitor's image-adjustment controls were hard to reach and manipulate. Like most of the monitors, the Ergo View 15 lacks convergence controls.

Overall, the Ergo View 15 provided a fully usable and clean image, but its list price is just too high for what you get.

FOR THOSE WHO HATE TO WAIT

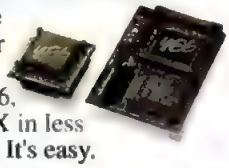
SHARE PERIPHERALS/ REDUCE WAIT TIME

Priced from $349, Buffalo's buffered devices let you speed printing performance and reduce wait time. Turn off Windows Print Manager and print three times faster. They share printers, plotters, modems, mini computers and works great for networked workgroups. With proven reliability, you save money by sharing expensive peripherals and reducing wait time. That's why you'll find one in the Office of the President.

You can select virtually any number of copies and even multiple printers. Windows and DOS are fully supported with pop-up menus. With features like front panel control, I/O configurability and expandable buffers up to 16MB, Buffalo devices are the best. We have all the accessory items, as well.

UPGRADE TO 486/ REDUCE WAIT TIME

Priced from $149, our CPU PowerKit upgrades will increase your computer performance from 75% to 600%. You can upgrade over 300 popular computers. Upgrade your 286, 386SX or 386DX in less than 15 minutes. It's easy.



THE BUFFALO DIFFERENCE

- Unlimited technical support
- 45-day guarantee
- A great warranty
- Free HyperWare™, $49 value, with all PowerKits
- Free PLUMP-Rx for CAD users, $175 value per user

See your dealer or call Buffalo today to find out more.

1-800-345-2356

BUFFALO

Buffalo Products, Inc. 2805 19th Street SE, Salem OR 97302 Fax 503-585-4505 34FAC

CIRCLE 328 ON READER SERVICE CARD

Sony Electronics Inc.

EDITORS' CHOICE Sony CPD-1430

BY DON CRABB

The $699.95 Sony CPD-1430, from Sony Electronics, is a 14-inch multifrequency autosyncing monitor with an outstanding fully digital control scheme. Although it is a bit pricey for a 14-inch monitor, its outstanding performance both on our objective lab tests and in subjective evaluations showed that the Sony CPD-1430 is well worth the bucks, which is why we gave it an Editors' Choice award.

During our tests, the Sony CPD-1430 provided a truly enjoyable and sharp image that leapt off the screen at us. The

Sony CPD-1430

monitor weighs 30 pounds, which is about what you would expect for a 14-inch monitor, and has a Sony-manufactured 14-inch tube with a 13.3-inch-diagonal active screen size. Its image was clear at all resolutions, and there were very few noticeable defects.

The Sony CPD-1430's Trinitron display does not support a resolution of 1,280-by-1,024 at a refresh rate of 60 Hz, but it does nicely handle the more reasonable 1,024-by-780 resolution with a flicker-free refresh rate of 74 Hz, which maintains a rock-solid image.

The Sony CPD-1430 did exceptionally well on our entire gamut of objective lab tests. It turned in the third-best composite score, with only the NEC MultiSync 4FGe and Digital PCXBV-DE providing better results. At 34.9 foot-lamberts, the Sony CPD-1430's measured maximum usable brightness was the third-best result in this roundup. The only brighter monitors were the Nokia Multigraph 449E and the ZDS ZCM-1540-UT (both had measure-

Only One Of The Leading Monitor Companies Makes Only Monitors.

That's one reason we're the choice of the pros.

So, what's the big deal about just making monitors? It's called picking one thing and doing it right.

That singular focus helped CTX leap into color monitor leadership.

Remarkably, now every 15 seconds someone in the U.S. buys a CTX monitor. That's more monitors than sold under household names like NEC, IBM, Sony, Samsung, and Mitsubishi.*

Unlike our more famous colleagues, we don't mess around with cars, radios, or toasters. We just make great monitors. All built around the clock in our ISO-9000-certified factories.

CTX multifrequency monitors offer all the features like flat square tubes. Anti-glare screens. Wide PC and Mac compatibility. Low radiation and energy-saver models.

CTX GREEN MONITOR FEATURE SUMMARY

MODEL	1468GM	1481GM	1482GM	1582GM	1585GM	1785GM	1786GM
Size	14"	14"	14"	15"	15"	17"	17"
Dot Pitch (mm)	0.28	0.28	0.28	0.28	0.28	0.27	0.26
Hor. Freq. (KHz)	30-38	30-50	30-62	30-62	30-65	30-65	30-85
1600 x 1280 NI	—	—	—	—	—	—	Yes(60Hz)
1280 x 1024 NI	—	—	—	—	Yes(60Hz)	Yes(60Hz)	Yes(75Hz)
1024 x 768 NI	87Hz/I	60Hz/NI	75Hz/NI	75Hz/NI	75Hz/NI	75Hz/NI	75Hz/NI
Mac Compatibility	—	—	Yes	Yes	Yes	Yes	Yes
Flat Square	—	—	—	Yes	Yes	Yes	Yes
Color Match	—	—	—	—	—	Yes	Yes
Digital Controls	—	—	—	—	Yes	Yes	Yes
MPR-II & ISO9241-3	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Power Savings	<30W	<30W	<30W	<30W	<5W	<5W	<5W

All come complete with a new two-year warranty and very affordable prices.

We even have new outrageous LCD color monitors.

But don't take our word for it. Ask the systems integrators and high-end resellers who buy them and put systems together for a living.

Their livelihood depends on repeat business. So they only resell equipment that offers exceptional performance, value, and reliability. From companies they can rely on for quick service and local support.

That's why they buy more CTX monitors than any other kind.

For more information, call the CTX branch office in your area. Insist on the monitor brand the pros demand. From the company that doesn't make TVs or toys.

CTX

We just make great monitors.

USA Headquarters 20530 Earlgate Street, Walnut, CA 91789, 909-595-6146, Fax 909-595-6293 **Technical Support** 1-800-888-2012 BBS 909-594-8973 **Southern Region** 6624 Jimmy Carter Blvd., Norcross, GA 30071, 404-729-8909, Fax 404-729-8805 **Eastern Region** 481 Edward Ross Drive, Elmwood Park, NJ 07407, 201-646-0707, Fax 201-646-1998 **Midwestern Region** 500 Park Blvd., Ste. 295C Itasca, IL 60143, 708-285-0202, Fax 708-285-0212 **Southwestern Region** 1225 E. Crosby Rd., Ste. A21, Carrollton, TX 75006, 214-416-9610, Fax 214-245-7447

*Based on official 1993 Monitrak U.S. monitor sales research. © 1994 CTX International, Inc. All brand names are trademarks or registered trademarks of their respective owners.

CIRCLE 329 ON READER SERVICE CARD

ments of 35.5 foot-lamberts).

The Sony CPD-1430 landed in the upper half of the test group on our modulation transfer function test, and measured as the eighth-best monitor in this roundup on our misconvergence test. It was the eleventh-best monitor on our pincushioning test.

Those excellent objective test results were backed by the Sony CPD-1430's equally impressive performance during our subjective evaluations. We did note a little pincushioning in the unit's displayed image, but it was not at all distracting. Also, we found a touch of misconvergence, but this too did not adversely affect the monitor's stellar image.

At a resolution of 1,024-by-768, the Sony CPD-1430's image didn't bow or break up when switching between Microsoft Windows and full-screen DOS sessions, and we noted that the image remained stable, with absolutely no noticeable screen bounce.

The Sony CPD-1430 is equipped with a full complement of digital user controls. Along with the standard adjustments for brightness and contrast are image controls for pincushioning, trapezoidal adjustment, balance, and image distortion. Like most monitors we tested, the Sony CPD-1430 lacked convergence and color-matching controls. The Sony CPD-1430 does not meet Energy Star power-conservation requirements, although it does comply with MPR II emissions standards.

Included with the Sony CPD-1430 is a captive miniDB-15 video cable, which makes connections a bit less convenient than with monitors that come equipped with detachable video cables. The monitor's aesthetically pleasing case was very well assembled, and the user manual Sony provided with our test unit was the best one we read.

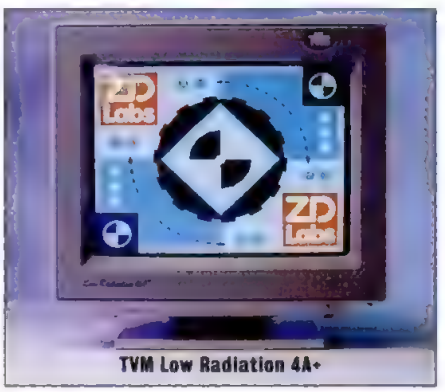
In every respect, the Sony CPD-1430 was one of the best monitors we saw in this roundup, regardless of cost or size. The monitor proved to be a truly complete package, providing a combination of excellent performance, comprehensive features, sharp image, pleasing aesthetics, and good usability. The Sony CPD-1430 is a quality monitor, and while it's not inexpensive, it's well worth every cent.

TVM Professional Monitor Corp.

TVM Low Radiation 4A+

BY DON CRABB

The TVM Low Radiation 4A+, from TVM Professional Monitor Corp., is a 14-inch multifrequency autosyncing monitor with analog image controls and a bargain-basement list price of $349. With above-average results on our objective measurements and in subjective evaluations, the TVM 4A+ provides a superb combination of price and performance.



TVM Low Radiation 4A+

The TVM 4A+ uses a Hitachi 14-inch tube and has a 13-inch active screen size. The monitor's shadow-mask display could not support a 1,280-by-1,024 noninterlaced resolution at a vertical refresh rate of 60 Hz. But it was able to handle its maximum noninterlaced resolution of 1,024-by-780 at a 72-Hz refresh rate.

In our objective examinations, the TVA 4A+ did well. Although the monitor did not produce any stellar test results, none of its objective test scores were worse than average. The TVM 4A+ landed better-than-average numbers on both our misconvergence and maximum usable brightness tests. Also better than average was the monitor's performance on our pincushioning test: Its score of 9.7 mils was the tenth-best pincushioning result among all tested monitors. The TVM 4A+'s modulation transfer function score continued the monitor's above-average performance trend.

By turning in above-average numbers on all our objective tests, the TVM 4A+ earned a composite score that ranked twelfth from the top. This is quite an impressive showing in view of the TVM 4A+'s low price.

Equally impressive was the TVM 4A+'s performance during our subjective evaluations. The monitor provided a surprisingly sharp image; it was mostly clear at all resolutions, with few serious defects. We found that the displayed image bowed slightly when the monitor switched between Microsoft Windows and full-screen DOS sessions at a resolution of 1,024-by-768. We also noted a bit of screen bounce during this exercise. While we did see a bit of pincushioning, it was not at all distracting. We also noted some misconvergence, but again, it did not adversely affect the monitor's image.

The TVM 4A+ includes a captive video cable with miniDB-15 connections on both ends, making connections a bit less convenient than for monitors with detachable video cables. The unit's analog image-adjustment controls lack pincushioning, keystoning, color, and misconvergence controls, so you will have to live with the image as provided. The 25-pound unit's case was well assembled and fairly good-looking. The included manual was acceptable.

Although some users may want a more full-featured monitor with digital controls, the TVM Low Radiation 4A+'s combination of price and performance is hard to beat.

ViewSonic

ViewSonic 15

BY BRUCE BROWN

The reasonably priced $549 15-inch ViewSonic 15 is a highly recommended monitor. It had very good objective test scores and equally impressive subjective evaluation results. During our entire testing procedure, the ViewSonic 15 was a pleasure to use and exhibited no observable image problems.

The ViewSonic 15 is built around a 15-inch Matsushita flat-screen tube. The monitor's maximum active screen size is 13.8 inches, and it has a 0.27-mm dot pitch. At a noninterlaced resolution of 1,024-by-768, the ViewSonic 15 can run at a very solid 76-Hz vertical refresh rate, which is higher than the typical 70 or 72 Hz required for flicker-free viewing. The monitor can also manage its maximum noninterlaced resolution of 1,280-by-1,024 at a vertical refresh rate of 60 Hz.

Except for its below-average modulation transfer function test score, which

was its only blemish, the ViewSonic 15 turned in better-than-average numbers on all our objective tests.

The ViewSonic 15's score of 30.1 foot-lamberts on our maximum usable brightness test was exceeded by five other monitors in our test group. On our misconvergence test, the ViewSonic 15's measurement of 3.8 mils was surpassed only by four other monitors: the ADI MicroScan 3GP, ETC ViewMagic CA-1464SP and CA-1565SP, and GoldStar Model 1510.

The ViewSonic 15's 11-mil measurement on our pincushioning test was not as stellar as its misconvergence and modulation transfer function results, but it was still a good enough score to place the monitor among the best third of our test group. The monitor's impressive overall performance on our objective tests earned it a composite score that was the tenth-best result we gathered in this roundup.

Equally impressive during our subjective evaluations, the ViewSonic 15 displayed a solid and crisp image that was very easy on the eyes. We did not find any trace of misconvergence or pincushioning during our subjective examination of the monitor's image. Also, the ViewSonic 15 had little screen glare and exhibited even less muddiness between text characters, regardless of the resolution. Whether switching between full and partial DOS screens, between full Microsoft Windows and full DOS screens, or between full Windows and partial DOS screens, the ViewSonic 15 was able to maintain a rock-solid image.

The ViewSonic 15 meets MPR II emissions standards. Also, the monitor supports VESA's DPMS signaling specification, which makes it compliant with Energy Star power-conservation requirements. A convenient front-panel LED indicates power status, with four power-consumption levels ranging from maximum power to less than 5 watts.

ViewSonic 15

The ViewSonic 15 offers a comprehensive array of analog image-adjustment controls. Along with the standard complement of adjustments for brightness and contrast, the monitor includes controls for pincushioning and color matching (a feature not found on many of our tested monitors).

WEN JK1565 Color Monitor

With nary a flaw either on our objective tests or in subjective evaluations, the ViewSonic 15 proved itself to be a high-quality monitor that delivers fine performance at a reasonable price.

Wen Technology Corp.

Wen JK1565 Color Monitor

BY JOHN R. QUAIN

The $695 list price for Wen Technology Corp.'s 15-inch Wen JK1565 Color Monitor is comparable with those of the leading monitors in our test group. Unfortunately, its displayed image quality doesn't measure up to that of the top performers in our roundup.

Although the Wen JK1565 is capable of a higher noninterlaced resolution than many of the monitors in this class—up to 1,280-by-1,024 pixels with a 60-Hz vertical refresh rate—its 15-inch screen size and standard 0.28-mm dot pitch makes such resolutions impractical.

Based on a 15-inch Hitachi flat-square tube with an active screen size of 13.9 inches, the Wen JK1565 features analog brightness and contrast dials with digital buttons for adjusting image size and position. The controls also allow you to correct for pincushioning, although not for trapezoidal distortion. Like most of the monitors we tested, the Wen JK1565 has automatic degaussing and no color-matching feature.

The Wen JK1565 we tested did not support the EPA's Energy Star specification or VESA's DPMS power-saving guidelines, but Wen Technology will equip the Wen JK1565 with these features for an additional $20. Our evaluation unit also lacked MPR II compliance, but for another $20 Wen Technologies will equip the Wen JK1565 to meet MPR II emissions standards. That brings the list price of a full-featured model up to $735.

The Wen JK1565's performance on our objective tests revealed respectable misconvergence (5 mils) and pincushioning (11.1 mils) scores in 800-by-600 mode. These results were in the best quarter and best third, respectively, of our group of tested monitors.

On the downside, our objective tests found that the Wen JK1565's image suffered from a lack of brightness. The monitor's score on our maximum usable brightness test was 18.5 foot-lamberts, which was twelfth from the bottom. This deficiency dragged the Wen JK1565's modulation transfer function score and composite score down to a below-average level.

During our subjective evaluations, we found the Wen JK1565 to have a lackluster image. This meant that the monitor's detailed screen drawings and fonts lacked a certain crispness. Image details suffered from further degradation in 1,024-by-768 resolution, and a screen of closely spaced letters was difficult to read in this video mode.

It takes the Wen JK1565 a good second or two to fade from a Windows to a DOS session. Furthermore, the monitor could not keep up during video-mode switching: It failed to make some transitions before the next graphics mode was encountered. The Wen JK1565 is covered by only a one-year parts-and-labor warranty—less coverage than the leading monitor manufacturers offer.

In sum, we found the 15-inch Wen JK1565 a below-average performer with a rather high price tag. The monitor failed to distinguish itself among its peers, both on our objective tests and in subjective evaluations. □

How do I know what computer is right for me?

Who'll be there to help me down the road?

The answer is easy.

1 800 600-7812 ext. 302

What about compatibility?

How can I be sure I'm getting a good deal?

Order from Apple and enjoy service as personal as your needs.

Buying a computer for your business is a big decision. And once you're ready to do it, how can you be sure you're getting what you need? Now it's easy — just call us. Apple® representatives are here 24 hours a day, seven days a week, to answer your questions and make sure you get what you need.

We've put it all together for you.

Macintosh® computers have always been easy to use, and we think they should be easy to own, too. After all, over three million small businesses just like yours are using Macintosh to perform all kinds of tasks faster and more efficiently. And we've learned a lot from them. So when you call, you'll hear about the complete systems we've created for you, with advanced, powerful computers and essential business software. We've taken the work out of choosing a system, to help you get to work fast. Whether you need to create a new business presentation, share files with a DOS computer, or just organize your routine accounting and correspondence, your new Macintosh has everything you need.

We're here when you need us.

From putting together the system that's right for you, to answering your questions a year from now, Apple experts are always ready to help you. Our Complete Small Business System even includes training tapes, to help make getting started a snap. Our toll-free support line means an Apple technician is only a phone call away. And of course, your new Macintosh includes a solid one year limited warranty, as well as a thirty-day, money-back guarantee.* When you buy a Macintosh, we're behind you.

Call now and save over $500.

There are plenty of good reasons to invest in a computer system for your business. And one good reason to do it now: the complete Macintosh Small Business System will save you over $500.† So not only is buying a complete system designed by Apple experts convenient, it's affordable, too. So why not give us a call and order today? After all, it's complete, it's a Macintosh, and it's that easy.

Macintosh Quadra 605 Complete Small Business System $1499

Complete Macintosh Small Business System

- Macintosh Quadra 605
- 25 MHz Motorola 68040
- 4MB RAM, 80MB hard drive
- 1.4MB built-in Apple SuperDrive floppy drive
- Apple 14" RGB color display
- Standard keyboard and mouse
- ClarisWorks, Best Books, Act, MacLink Plus PC Connect, FileDuo, Watermarker
- Global Village Teleport Bronze 2400 external modem
- 2 personal training tapes
- Built-in networking
- Dependable service and support from Apple experts

$1499

Complete Macintosh Multimedia System

- Macintosh Quadra 605
- 25 MHz Motorola 68040
- 4MB RAM, 80MB hard drive
- 1.4MB built-in Apple SuperDrive floppy drive
- Apple 14" RGB color display
- Standard keyboard and mouse
- AppleCD 300 CD-ROM drive
- AppleDesign Powered Speakers
- A choice of three CD titles
- Starter CD with easy-to-use tutorials
- Astound, ClarisWorks, Watermarker, clip art
- ClarisWorks personal training tape

$1899

PowerBook 145B Small Business Mobility Solution

- 25 MHz 030 processor
- 4MB RAM; 80MB hard drive
- ClarisWorks, Best Books, Act, MacLink Plus PC Connect, FileDuo, Watermarker

$1529

Other special values also available. And if we don't have exactly what you're looking for, we'll be happy to refer you to your local authorized Apple reseller.

5 reasons to order from Apple

- Great Values
- Speedy Delivery
- Easy Ordering
- Apple Assurance
- Apple Business Lease

Prices may be even lower, so call anytime for the latest offers.

1 800 600-7812 ext. 302

24 hours a day, 7 days a week

Apple Business Direct

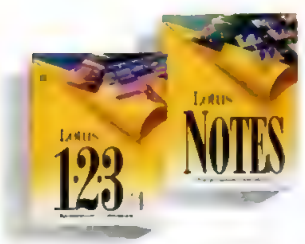
Apple

We want you to be 100 percent satisfied with your Macintosh. If for any reason your purchase isn't exactly what you wanted, simply call our customer service representatives within 30 days and we'll be happy to assist you. Software packages must be unopened. †Based on a comparison of the price of the Complete Small Business System with the Apple Price of the hardware and the estimated price of the software if purchased separately. ©1994 Apple Computer Inc. All rights reserved. Apple, the Apple logo, and Macintosh are registered trademarks, and Macintosh Quadra, PowerBook, and SuperDrive are trademarks of Apple Computer, Inc. MS-DOS is a registered trademark of Microsoft Corporation. All other third-party products are trademarks of their respective companies. Offer good while supplies last. Offer good only in U.S.A.

PEOPLE WHO HAVEN'T EXPERIENCED OUR 1-2-3 WORKGROUP FEATURES PROBABLY HAVE A FEW QUESTIONS.

The problem is this: while many people might need to work on the same spreadsheet data, most spreadsheet software can't manage this process. Only Lotus® 1-2-3® Release 4 for Windows™ lets you share data and ideas, collaborate with co-workers, and work the way you work best – in a team.

It starts with the powerful Version Manager™ technology built into 1-2-3 Release 4. As a spreadsheet changes, Version Manager tracks the changes, when they were made, by whom, for what reason. You can see the thinking that went into the spreadsheet. So you get better decisions out of it.



1-2-3 AND NOTES–THE ONLY WORKGROUP SOLUTION.

And 1-2-3 works seamlessly with Lotus Notes,® the market-leading groupware. Notes replicates the 1-2-3 document across the network so that everyone, even remote users, can access and work on the same document concurrently. And Notes sends instantaneous notification as changes are made. For 1-2-3 users, it couldn't be simpler–you don't need to know Notes at all – just how to save a file in 1-2-3.

Then there's Notes/FX,™ integration technology that goes beyond DDE and OLE, to let you build the power of 1-2-3 into your Notes applications. With a single click from Notes you can launch a 1-2-3 template that's already filled in with key information from the Notes database. Then, changes to the 1-2-3 template are updated in the Notes document for unparalleled two-way integration.

Of course, 1-2-3 Release 4 features close integration with the other Lotus applications that make up Lotus SmartSuite.® So, for example, it's easy to pull 1-2-3 data into Ami Pro® for word processing or Freelance Graphics® for a presentation.

And right now you can upgrade to either 1-2-3 Release 4 or our new 1-2-3 Release 4: Multimedia Edition delivered on CD-ROM for just $119. Or for an even better deal upgrade to SmartSuite for just $299.* Visit your Lotus Authorized Reseller or call **1-800-TRADE-UP, ext. 9406**** to upgrade or to order a free demo disk.

Lotus
Working Together®

*$299 promotional price available while supplies last. **In Canada, call **1-800-GO-LOTUS**. Prices may vary. °1994 Lotus Development Corporation, 55 Cambridge Parkway, Cambridge, MA 02142. All rights reserved. Lotus, 1-2-3, Working Together, Lotus Notes, SmartSuite, Ami Pro and Freelance Graphics are registered trademarks and Notes/FX and Version Manager are trademarks of Lotus Development Corporation. Windows is a trademark of Microsoft Corporation.

PERSONAL TAX PREPARATION

Dancing *To a New Tune*

It's been a turbulent tax year: Amid a crescendo of fear and uncertainty, the president, Congress, and the IRS have orchestrated a brand-new tax code. More than ever, tax preparation software can help you keep in step.

by Ted Stevenson and Kathy Yakal

If you pay taxes and you own a PC, you owe it to yourself this year to take a serious look at personal tax preparation software. The familiar IRS waltz we've danced to in years past has turned into a tango, and all of us could use some help in finding the new beat. Not only are tax software vendors up to the minute on all the new twists and turns, but over the past couple of years, they

IN THIS REVIEW

AM-Tax Personal 1040 238
Andrew Tobias' TaxCut for DOS 240
Andrew Tobias' TaxCut for Windows 240
CA-Simply Tax for DOS 255
CA-Simply Tax for Windows 255
Personal Tax Edge for DOS 255
Personal Tax Edge for Windows 255
TaxPerfect Personal 1040 259
TurboTax for DOS 260
TurboTax for Windows 260

Illustration by David Kahl

HIGHLIGHTS

Personal Tax Preparation

THE TAX SOFTWARE packages for 1993 are industry mainstays; the one new name, CA-Simply Tax, is an overhaul of SoftKey Software Products' EasyTax. Just the same, the head-start editions show big changes from last year: Improved interfaces and streamlined navigation aids make the labyrinthine path of tax preparation easier to follow than ever.

THREE APPROACHES to filling out your tax forms—direct data entry, the interview, and the shoebox—typify the strongest packages, with the interview feature (called the Navigator) in Andrew Tobias' TaxCut taking innovation honors. Personal Tax Edge's color-coded data-entry method is another winner. Shoebox features help you organize your accumulation of tax-related data, connecting information to the proper forms and schedules. The shoebox features in CA-Simply Tax, TaxCut, and TurboTax do this best.

A WEALTH OF HELP features mark the best programs. Besides program help, you'll find IRS instructions, tax-saving tips, comparisons to national averages, tax-law guides, and clear definitions of confusing tax terms. The tax-help features in CA-Simply Tax shine in this area, as do TurboTax's Deduction Finder and TaxCut's Explain Tax Form and Find Tax Form features. Notepads and calculators round out the auxiliary aids that are available in many packages.

AUDIT FEATURES wrap up your work, trying more than ever to catch anomalies and offering even more tips for covering all your bases. TaxCut's Auditor and Review Your Entries features perform quite well, as do the audit features in Personal Tax Edge and TurboTax.

have been working out some revolutionary new approaches to doing the tax dance—steps that create a logical path through what often seems to be an illogical process.

And tax software is certainly a bargain this year; in some cases, it's almost free. A year or two ago, you could expect to pay about $50 on the street for a top tax package. This year, everybody's street prices are lower, but Computer Associates International has stood the market on its ear by going a giant step further and "selling" its new products—the DOS and Windows versions of CA-Simply Tax—for the price of shipping, or $13.90 for both the head-start and final editions. Parsons Technology has dropped the price of the DOS and Windows versions of Personal Tax Edge, head-start editions, to $12; the final editions will be $19. It seems unlikely that pricing will ever return to "normal."

Against this backdrop of turbulent change, we review the head-start editions of all the DOS- and Windows-based tax preparation packages that have been significantly upgraded since last year (upgraded, that is, in terms of the interface and other program content; every tax package is upgraded to reflect current tax code). The only new name on the roster—CA-Simply Tax—turns out to be a familiar product under the hood; it's an extensively remodeled version of Softkey Software Products' EasyTax under the new ownership of Computer Associates International. Not reviewed separately here is Kiplinger TaxCut, a special version of Andrew Tobias' TaxCut available through MECA Software and Kiplinger. While functionally identical to the standard package, Kiplinger TaxCut incorporates a wealth of Kiplinger tax guidance on-line.

WHY BUY?

What are the advantages of doing your own tax return with the help of your PC? In a nutshell: confidence, convenience, speed, and economy. Since few of us are tax-law experts, on-line access to IRS instructions and clear interpretations thereof are certainly important ingredients. Many tax packages will also give you access to expert advice and tax-saving tips to help you find and take every deduction to which you're legally entitled.

Tax software also streamlines your work in several ways. For one, it reduces repetition. You enter information such as your name and Social Security number only once, for example, not once on every form. This saves time and helps ensure accuracy. Another is that it performs all calculations automatically and error-free. Total amounts are transferred to other lines and documents as necessary. Furthermore, you'll probably never have to trudge to the local IRS office because you spoiled your last copy of Schedule A; most of the forms and schedules you'll ever need are built right in. And finally, audit—or review—features automatically comb your return for omissions and anomalies that might trigger an IRS audit or prompt a penalty.

GO TO THE PRO, OR NO?

In reality, however, tax preparation software isn't appropriate for everyone. Some people's tax scenarios are genuinely complex enough to warrant the services of accounting and tax professionals. And for others, the feeling of confidence that comes with a professional service is worth the cost, whatever it may be. But for millions of others, tax preparation via PC software makes perfect sense. Consider the range of scenarios we used in testing the packages for this roundup:

Our simplest example was that of a childless couple whose W-2 income totalled $50,000. They received taxable interest and paid home mortgage interest, contributed to IRA accounts, and made charitable contributions.

Our midrange scenario was that of a married couple with one child. Both parents were self-employed, earning $75,000 between them. They rented their home and used two rooms as offices. They had medical, business, and day-care expenses, and they had paid estimated taxes.

Our Contributors: KATHY YAKAL is a computer journalist who has covered the PC industry since 1983. TED STEVENSON was the associate editor in charge of this story, and AMARENDRA SINGH was the project leader.

Our most complex example was that of a married couple with three children. The couple earned slightly more than $140,000, between the income she earned from her small business and his W-2 income. Because of some unusually high medical expenses, they sold some stocks during the year; they also took a small loss on their rental cabin and had child-care costs.

Even our top scenario didn't stretch the limits of the products here. In fact, for those with the confidence to tackle more complex returns, these packages provide forms and schedules to handle still other financial variables.

PC MAGAZINE

EDITORS' CHOICE

- **Andrew Tobias' TaxCut for Windows**

Last year, a revamped interface was a major factor in garnering an Editors' Choice designation for both the DOS and Windows versions of TurboTax; Andrew Tobias' TaxCut packages finished a close second. This year, MECA Software has turned the tables, doing some serious revamping of its own. While both the DOS and Windows versions of TaxCut and TurboTax offer in-depth guidance, easy data entry, and no-brainer navigation, the 1993 edition of TaxCut for Windows is clearly superior in all three areas. Thanks to the efforts of MECA Software developers, TaxCut for Windows now sports the most graphically appealing interface in the category. The newly revamped interview function (now called the Navigator) embodies a far more mature, fuller use of Windows conventions than did the interview functions in previous versions; it provides the easiest-to-follow path through tax preparation we've seen. The package also offers the most in-depth explanations of questions, procedures, and tax laws of all the packages we reviewed, and these aids are available from any place within the program. Finally, it does the most thorough after-the-fact checking of your completed return out of all the packages here. During this process, the package makes it easy for you to enter changes and corrections by displaying the actual line in question, live, right on the screen.

While TaxCut for DOS includes these same new features, and is on a par with the DOS leaders in this field, TaxCut for Windows stands out because of its superior graphical interface and navigational abilities.

Although top honors this year clearly go to TaxCut for Windows, you might nonetheless want to consider either TurboTax or Personal Tax Edge. Both products have been supported for years by highly creditable, reliable publishers, and they continue to improve with age. We give them honorable mention here and can recommend both without hesitation.

In the new TurboTax (both the DOS and Windows versions), ChipSoft has tightened navigation and operations overall and repaired some of the quirks in last year's revolutionary EasyStep interface, adding depth and clarity in the process. The company has also fixed the printing problems that plagued some users in last year's final Windows version. (TurboTax for Windows now utilizes Windows 3.1's TrueType technology.) Furthermore, ChipSoft has added to both versions a Deduction Finder feature and tax graphs.

Parsons Technology's Personal Tax Edge—which comes in DOS and Windows versions—perennially finishes third behind TaxCut and TurboTax, but it has crowded considerably closer to its competition this year. Its Windows version, introduced last year, may actually be the product of choice for people who want a Windows program but don't need a lot of extras. The interface in the direct data entry and interview options is clean and uncomplicated, and abundant help is there when you need it. Still, it doesn't offer the depth of guidance provided by TaxCut.

You won't go wrong with any of this year's three major tax software contenders—unless you don't have adequate hardware to run them. In such cases, AM-Tax Personal 1040 offers a viable if less than feature-rich solution.

HIGH ROAD, LOW ROAD

Today's tax packages offer users three basic approaches to the core work of compiling a tax return. Those with simple, straightforward returns will probably be comfortable with *direct data entry* (the only option offered by some products), where you work your way through forms and schedules pretty much as you would on paper. Here, the program does all the calculations and transfers numbers between forms where appropriate.

The *interview*, one of the innovations mentioned above, is the preferred option for many people. It adds a friendly, intelligent, linear element to the not-so-friendly and decidedly nonlinear process of tax preparation, minimizing confusion and anxiety while promoting accuracy and completeness. Rather like an experienced human tax preparer, it asks you a series of simple questions. In the background, it enters the information you provide in the appropriate places on the proper forms and schedules.

The third option, the *shoebox* (known variously here as the *File Cabinet, Organizer,* and *ShoeBox*), is a less-linear approach. Though details vary from product to product, the basic idea is that the software provides you with lists—of tax-related documents, receipts, people, institutions, and the like. You match up documents and receipts that you've accumulated over the year with items in the lists, and the software tells or shows you where the information in question belongs in your tax return. You're less likely to choose this as your primary data-entry method—all of the lists aren't compre-

Suitability to Task: Personal Tax Preparation

Tax preparation software can help eliminate much of the frustration of doing your taxes by guiding you through your tax chores and preparing the actual returns. We looked at six tax programs (four of which have both DOS and Microsoft Windows versions), examining their preparation tools, the guidance they offer, their accuracy, and their final output. In each category, we evaluated each package's power (comprehensiveness of features) and ease of use.

We look carefully at the tax **preparation** capabilities of each program. If a product includes complete representations of the most commonly used forms, calculates them accurately, and guides users in filling out supplemental forms and schedules where required, we have rated it at least fair. To garner a higher score, a program has to go beyond that, importing financial data from a variety of money management programs and offering automatic links to support forms, schedules, and worksheets. A top-rated program must also provide both an interview option for data entry and an electronic organizer (or *shoebox*) for classifying miscellaneous income and expenses. It should also have helpful utilities such as a pop-up calculator, a notepad, or bookkeeping tools.

In evaluating each program's **guidance** elements, we asked, Are the explanations of tax law available at the precise time a user is likely to need them? Are they easy to find? And—most important—are they understandable and thorough? A high score indicates that the program's designers were able to make the IRS's often incomprehensible instructions comprehensible. The best programs help you pare down your tax debt by offering tax-saving suggestions. They also let you explore alternative tax-filing options by building "what if" scenarios that compare your return against U.S. averages, and also let you compare the results of filing separately against filing jointly with your spouse. The best programs also offer ways to audit and review your completed return, checking for omissions and entries that might trigger an IRS audit.

Our **filing** task involves a program's ability to create IRS-approved forms on a variety of printers without requiring additional software or font cartridges. Printing IRS replica forms is a real advantage. Top-ranked programs also offer an easy path for electronic filing and do not charge any fee beyond the IRS filing fee.

SUITABILITY TO TASK

Product Name	POWER	EASE
Preparation	Poor	Excellent
Guidance	Fair	Good
Filing	Good	Fair
Filing	Excellent	Poor

hensive, and it's easy to miss something—but the shoebox method is great for those odds and ends you just can't find the proper place for or as a supplement to the final review process.

Then again, if you use a personal finance program such as Managing Your Money or Quicken, you may be able to import your tax data directly from it. Barring that, most tax products today support indirect data transfer via the now-standard .TXF (Tax Exchange Format).

HELP!

The very word takes on an added dimension in the context of tax software. In addition to help with program operation, tax software users also need help with IRS instructions and tax law. Tax packages have become pretty adept at serving up the right kind of help at the right time. To get program help in Personal Tax Edge, for example, you tap F1; for context-sensitive IRS instructions, you use Control-F1. It's easy to remember.

Of course, verbatim IRS instructions may not clarify what's needed in every situation. Several of the top programs offer interpretations of IRS legalese stated in clear, simple English. TurboTax (available in DOS and Windows versions) provides an icon that users click to access such simplified explanations.

Help in a tax context also means help with numbers and record keeping. Every tax product has a built-in calculator for totaling up figures. In addition, the major programs offer "notepads" for jotting down memos and "bookkeepers" that let you itemize figures offstage, saving the itemizations for your own reference should a question arise. CA-Simply Tax and TaxCut (also available in DOS and Windows versions) go farther, providing worksheets within forms and schedules wherever you might want to break an entry down into an itemized list.

END GAME

The audit—or review—feature, offered by every tax package here, while hardly as comprehensive as an IRS audit, does check your return for completeness, identify out-of-line figures likely to trigger an IRS audit, and compare your income, deduction, and tax-payment figures with national averages. The better packages, Personal Tax Edge, for example, also make it easy to compare the results of joint and separate filing for married couples.

Once all the answering, adding, itemizing, and checking are done, it's time to file your return; you can just sit back and relax while the system prints it all out. All the packages we review can print IRS-approved forms and schedules, and if you have a graphics printer, all can print at least parts of your return in "replica" mode, producing forms that closely resemble preprinted IRS forms. Finally, all our personal tax packages offer an extra-cost electronic filing option, touted as the quickest way to receive a refund, if one is due.

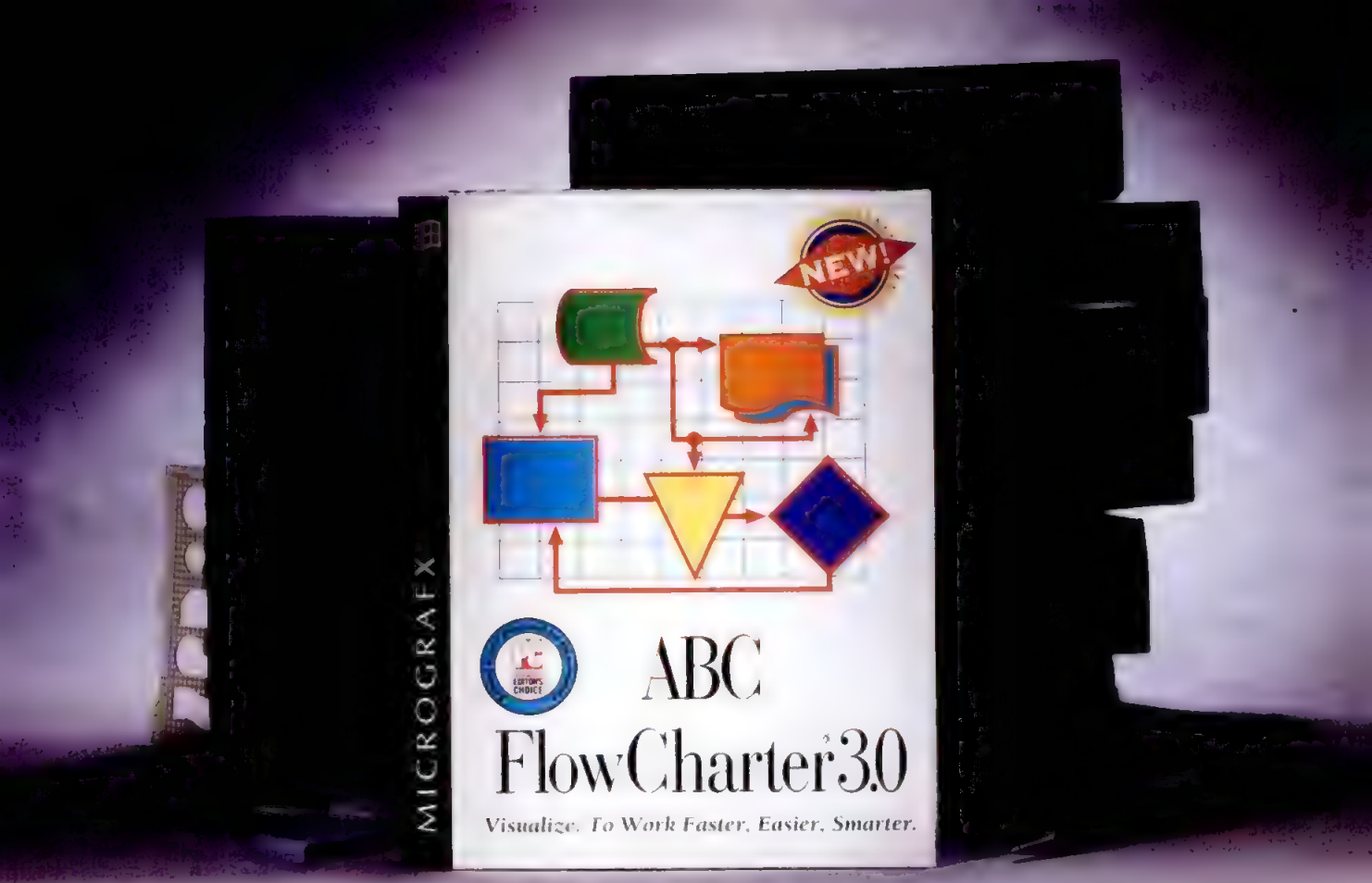
Justice Oliver Wendell Holmes once voiced the opinion that "taxes are what we pay for a civilized society." Views may differ on whether or not we get full value for that payment, but sooner or later, we all have to face the music and pick a partner for the tax dance. Today's personal tax products can ease that confrontation.

AM Software Inc.

AM-Tax Personal 1040

ALL REVIEWS BY KATHY YAKAL

While the big-name tax products continue to duke it out for dominance in the tax preparation arena, AM Software continues to build quietly on the simple but capable framework it offers tax filers within its DOS-based AM-Tax Personal 1040. Though this year's model looks much the same as last year's, at $39 it's much less expensive, and there have been several in-



There are many ways to do flowcharts. Only one was voted "best".

Fast and easy ABC FlowCharter 3.0. The world's #1-selling, #1-rated flowcharting solution.

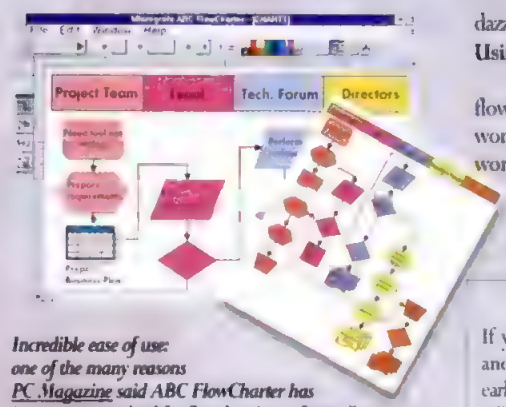
They looked at all the major products people are using to do flowcharts. Then the editors at *PC Magazine* made their choice.

The winner? Not surprisingly, it was the world's #1-selling flowcharting solution: ABC FlowCharter® from Micrografx.

Why? It's easy.

Around the world, flowcharting is helping managers track the flow of information, streamline procedures and boost quality and efficiency. But they don't have time to draw and redraw charts – or learn a complicated graphics package. And that's where ABC FlowCharter comes in.

With ABC FlowCharter 3.0, creating great-looking flowcharts is as easy as "point and click." Just choose the shapes you want from handy shape palettes. Drop them where you want them. And let ABC FlowCharter draw in the connecting lines. Then add text, color, clip art, scanned images – even video clips. You'll be able to create dazzling, presentation-quality charts in minutes!



Incredible ease of use: one of the many reasons PC Magazine said ABC FlowCharter has "set a new standard for flowcharting software."

Using another solution? Switch now!

If you're using another software package for flowcharts, or still drawing them by hand, you won't *believe* how much faster and easier you'll work with new ABC FlowCharter 3.0. And if you act quickly, you can take advantage of special pricing and free bonus software. *See your dealer or call today!*

Act fast and get a FREE Bonus!

If you're doing flowcharts with another graphics package or an earlier version of ABC FlowCharter, call now to take advantage of special upgrade pricing. And for a limited time, all purchasers get a FREE copy of incredible new SnapGrafx™ (reg. $295) – the software that lets you create fabulous graphics without drawing. *Call today!*

1-800-598-1960

M I C R O G R A F X ®

Micrografx, Inc. 1303 Arapaho, Richardson, TX 75081 • Micrografx has offices in Canada, France, Germany, Mexico, Netherlands, Spain, United Kingdom. © 1991 Micrografx, Inc. All rights reserved. Micrografx and ABC FlowCharter are registered trademarks of Micrografx, Inc. All other products are trademarks or registered trademarks of their respective owners.

Available at: COMP USA • Computer City • Corporate Software • Egghead Software • Software Spectrum • Softmart • 800-Software

CIRCLE 230 ON READER SERVICE CARD

ternal improvements—such as "what if" comparisons, audit checks, and on-line tax help—that make it more suitable for the tax neophyte.

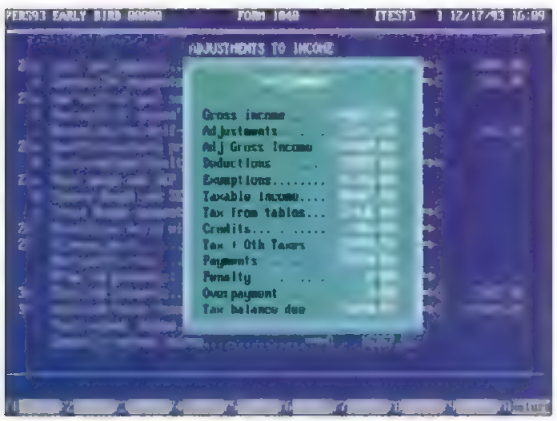
FORMS COMPLETION

Unlike most packages reviewed here, AM-Tax offers only direct data entry methodology. (TaxPerfect Personal 1040 is the other package here that offers only this approach.) You move through the 1040 form to enter information, navigating via the Enter or cursor keys (since there's no mouse support) and hitting Page Down when you get to the bottom of the screen to see the next. Fields that require supporting detail on another form, schedule, or worksheet are marked with asterisks; you can move to the appropriate document quickly by pressing F6. Alternatively, you can press F8 to get a complete list and choose from that. Hitting F10 or Escape returns you to the previous form. Calculated fields are marked with a *C;* you can override these by either pressing F9 or filling out an itemized worksheet.

SUITABILITY TO TASK

AM-Tax Personal 1040

	POWER	EASE
Preparation	Fair	Good
Guidance	Poor	Good
Filing	Good	Good



Get a quick look at the totals in major tax-form categories by pulling up a tax summary in AM-Tax.

AM-Tax does some subtle—and slightly risky—auditing as you enter data: It automatically changes certain answers if they're not in line with tax law. For example, we entered a Social Security withholding figure on the W-2 form that was not in line with the higher 1993 Social Security wage ceiling; AM-Tax changed the number without alerting us. The same thing would happen if, say, you tried to enter a $3,000 IRA deduction. While this tinkering is done judiciously (and you can override the changes), a warning flag of some sort seems in order.

While earlier versions of AM-Tax offered little help, this year's edition sports context-sensitive on-line assistance. Pressing F1 gives you a brief explanation of IRS rules for the current line or document and clarifies error messages and cross-reference information. AM-Tax doesn't have specialized financial calculators or notepads for every field, but it does have a simple pop-up calculator and a note screen.

A FINAL LOOK

You can review your return in a number of ways. The Tax Summary window, for example, displays the key figures in your forms and schedules. New this year are the "what if" worksheet and the Audit Check feature. These let you compare various tax scenarios, and they automatically inspect your return for inconsistencies, errors, and omissions. AM-Tax's audit feature does not look for overrides of calculated, protected fields—as do the audit features in the other products here—so you'd be wise to verify those manually.

AM-Tax has added electronic filing through Nelco, a third-party transmitter. Additional software (priced at $19) must be purchased to file this way. And you can still print IRS-approved forms on plain paper or overlays. But to print exact replicas, you'll need to buy additional software from AM Software.

Though there's more hand-holding in this year's AM-Tax, it's probably still not enough for those with complicated tax returns, a dearth of knowledge about IRS tax law, or both. The product's new features, however, do open it up to a slightly larger potential audience. And though its few-frills approach to tax preparation doesn't help you minimize your tax liability or understand your return nearly as well as a program like TaxCut does, it will do the basic legwork as accurately and capably.

FACT FILE

AM-Tax Personal 1040
AM Software Inc., 1500B NW Vivion Rd., Kansas City, MO 64118; 816-741-7848; fax, 816-741-1517.
Circle 453 on reader service card

MECA Software Inc.

Andrew Tobias' TaxCut for DOS
Andrew Tobias' TaxCut for Windows

Users of Andrew Tobias' TaxCut for DOS and Andrew Tobias' TaxCut for Windows ($79.95 each) are in for some pleasant surprises. The Windows version has come a long way since last year, both in its use of Windows conventions and in the amount of guidance that's been added to an already thorough, reliable program. More important, MECA Software has completely overhauled its interface, revamping the interview feature into a colorful "Navigator" that guides novices and eases them into the tough task of tax preparation. Users of the DOS version will also find more help and easier navigation; the package looks different from the Windows ver-

SUITABILITY TO TASK

Andrew Tobias' TaxCut for DOS
Andrew Tobias' TaxCut for Windows

	POWER	EASE
Preparation	Excellent	Excellent
Guidance	Excellent	Excellent
Filing	Excellent	Excellent

sion because of its lack of graphics, but the two products function similarly.

Users will still be able to choose among three approaches to tax preparation: the interview (called the Navigator), the shoebox (called the ShoeBox), and direct data entry. While the comparable interview features in Personal Tax Edge and TurboTax help you determine what questions to answer and make com-

NOW DAZZLING 3-D IS AS EASY AS...

1. *Sketch the outline of an object.*

2. *Click and "sweep" it into three dimensions.*

3. *Click again to rotate the object as desired.*

NEW "INSTANT 3-D" JOINS DESIGNER'S LEGENDARY ARRAY OF PROFESSIONAL DRAWING TOOLS!

Professional illustration made easy. That's what has made Micrografx Designer™ the choice of artists, designers and illustrators worldwide. And now, we've made it even *easier* for you to produce dazzling drawings. Because with just a few clicks of your mouse, you can render objects in true 3-D – then rotate and "light" them to achieve striking results in no time at all!

The finished illustration, with smooth shading at the click of a mouse!

"The new version of Designer is a tour de force, encompassing advanced 3-D conceptual modeling, sophisticated text handling, precision illustration and symbol management, full client/server OLE support and exceptional color handling."

Windows Sources
December, 1993

An all-new interface makes Designer incredibly easy to use. But it's packed with enough features to satisfy the most demanding professional. Including photo retouching, color matching, color separation and much, much more.

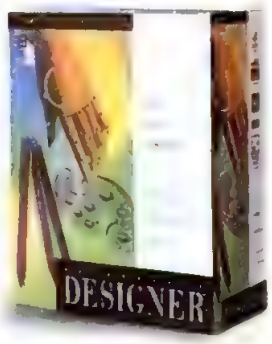
Find out why Designer is becoming the standard for precision illustration. *See your dealer or call today!*

Upgrade to Designer 4.0 now and save big! If you're using another PC illustration product, act fast and upgrade to Designer 4.0 for only **$199**. Current Designer users, only **$149**. *Call today!*

MICROGRAFX®

DESIGNER 4.0

The Professional's Choice for Graphics Illustration



1-800-877-8668

MICROGRAFX®

Micrografx, Inc., 1303 Arapaho, Richardson, TX 75081 (214)234-1769 Micrografx has offices in Toronto, Paris, London, Milan, Sydney, Madrid and Tokyo. Copyright © 1994, Micrografx, Inc. All rights reserved. Micrografx is a registered trademark and Designer is a trademark of Micrografx, Inc. All other products are trademarks or registered trademarks of their respective owners.

CIRCLE 361 ON READER SERVICE CARD

New Tax Laws: *What's in Store?*

by Kathy Yakal

It hasn't been pretty: The Revenue Reconciliation Act of 1993 whipped politicians, talk-show hosts, and taxpayers in general into a frenzy rooted in fear and uncertainty. The rhetoric started flying early in the 1992 presidential campaign, with George Bush and Bill Clinton duking it out over the dreaded *t* word; it intensified as the drama of congressional maneuvering and debate heated up, leading to the final passage of the Clinton tax plan.

Most Americans seem to agree that the federal deficit has gotten out of hand and needs to be curbed and that health-care reform is important, but the question of who is going to pay the taxes that will finance these goals has somehow overshadowed the problems themselves. Many taxpayers are still uncertain of the answer, even today.

MIDDLE-CLASS TAX CUT?

A significant portion of revenues is expected to come from two new tax brackets created by the new law. A sizable group will be asked to pay 36 percent, based on *taxable income* (adjusted gross income minus deductions), as follows:

Filing status	Threshold
Single	$115,000
Head of household	$127,500
Married, filing separately	$ 70,000
Married, filing jointly	$140,000

An additional surtax of 10 percent (equivalent to a 39.6 percent tax rate) will be assessed on taxable income over $250,000 for couples filing jointly and $125,000 for those who are single, or married and filing separately.

As these heftier tax bills may catch some filers unprepared, the IRS plans to allow those who fall into the two new tax brackets to pay the portion resulting from the increase in three annual installments—with no penalties.

Other alterations will impact larger numbers of people, but in a smaller way: "Upper-income" taxpayers—those with an *adjusted gross income* (gross income minus adjustments such as IRAs and alimony payments) of more than $108,450 (filing jointly) or $54,225 (single or married and filing separately)—will be subject to limits on itemized deductions. Personal exemptions will be reduced above certain income levels too. Furthermore, 1994 estimated tax payments must be based on 110 percent rather than 100 percent of the previous year's tax liability if your adjusted gross income was over $150,000. Allowable deductions for moving have been minimized, and the home-office expense deduction is even more difficult to claim than it has been in the past.

All the furor over the Revenue Reconciliation Act of 1993 may mean more uncertainty than usual about what applies to us.

A BRIGHTER SIDE

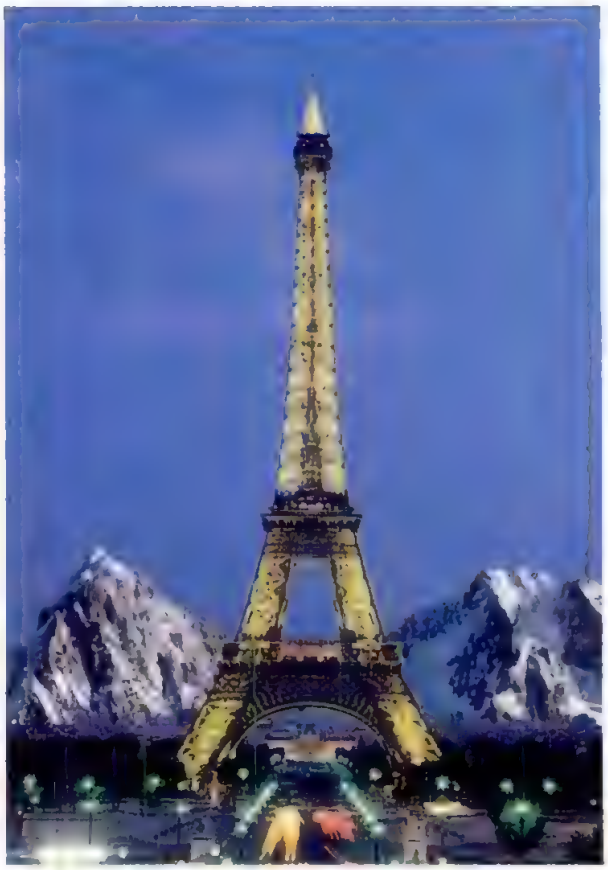
On the other hand, the 25 percent deduction for health insurance costs incurred by the self-employed has been reinstated. Up to $5,250 of employer-provided educational assistance has been upheld, retroactive to its expiration in June 1992. Furthermore, the 10 percent excise tax on boats, airplanes, jewelry, and furs has been repealed, retroactive to purchases made back to January 1, 1993. Curiously, the excise tax remains in place for cars. The capital gains deduction for small businesses constitutes a tax break for those with profits gleaned from selling certain stocks held for five years (there are several limitations placed on this rule). And the new code makes provisions to help troubled real estate developers.

If these alterations aren't enough for you, fear not: There's more in store. The Revenue Reconciliation Act is a slow, cumulative reform. Next year, for example, only 50 percent of business-related meals and entertainment will be deductible. The dollar limit for income and wages subject to the Medicare tax will be eliminated. Taxpayers with incomes above $34,000 ($44,000 if married and filing jointly) will have 85 percent of their Social Security benefits taxed. Withholding on supplemental wage payments will increase to 28 percent.

All the furor over this year's act will most likely mean we'll all have an eagle eye on our returns. It may also mean more uncertainty than usual about what applies to us. And those finding their tax bills going up will be more eager than ever to ensure that every possible deduction is noted and claimed.

All of the tax preparation software packages reviewed here will—in their final versions—incorporate every change made by 1993's mandate. Most of the products provide a helpful outline of the major changes (as they do every year), while the best of them help you both comply with all IRS regulations *and* take every possible legal deduction. So if you're as apprehensive as most people are about this eventful tax year, try to relax. If you're going to worry, worry about things you *can* change.□

How To Move Mountains.



Instantly.

Fast, easy changes. One reason Micrografx Picture Publisher® 4.0 is the #1-rated image editing software.

Step aside, Photoshop™ and Photostyler.™ The days of slow, frustrating imaging editing are over!

With new Picture Publisher 4.0, you'll be able to move objects (like the mountains above) with a click of your mouse. Rearranging your compositions at will without having to start over.

FastBits™ means you'll no longer have to load an entire image to retouch part of it. And you can work on a low-res version for even greater speed.

	Picture Publisher 4.0	PhotoShop 2.5	PhotoStyler 2.0
Object Layers™	Yes	No	No
FastBits™	Yes	No	Yes
Text Entry on Screen	Yes	No	No
Macro	Yes	No	No
EffectsBrowser™	Yes	No	No
Suggested Retail	$595	$895	$795

You'll also enjoy text placement right on your images. An EffectsBrowser™ for experimenting with filters and effects. The best masking tools in existence, and dozens of other advantages.

"Goes beyond any image editor anywhere."
PC Computing 9/93

"No program makes high-end image editing easier than Picture Publisher." (recommended over PhotoShop and PhotoStyler)
InfoWorld 8/30/93

"For professionals, Picture Publisher provides all the power needed..."
PC Magazine 10/12/93

Move up to Micrografx Picture Publisher 4.0 for only $199!

Using another image editor? Act fast and upgrade to Picture Publisher 4.0 for only $199. See your dealer or call:

1-800-597-3510

M I C R O G R A F X

Micrografx, Inc., 1303 Arapaho, Richardson, TX 75081 (214)234-1769. Micrografx has offices in Toronto, Paris, London, Milan, Sydney, Madrid, Munich and Tokyo. Copyright © 1994, Micrografx, Inc. All rights reserved. Micrografx and Picture Publisher are registered trademarks of Micrografx, Inc. All other products are trademarks or registered trademarks of their respective owners.

CIRCLE 317 ON READER SERVICE CARD

SUMMARY OF FEATURES

Personal Tax Preparation

PC MAGAZINE EDITORS' CHOICE

Products listed in alphabetical order ■ = YES □ = NO	AM-Tax Personal 1040	Andrew Tobias' TaxCut for DOS, Andrew Tobias' TaxCut for Windows	CA-Simply Tax for DOS, CA-Simply Tax for Windows	Personal Tax Edge for DOS, Personal Tax Edge for Windows	TaxPerfect Personal 1040	TurboTax for DOS, TurboTax for Windows
General Features						
List price	$39.00	Head-start version, $10.00; final version, $79.95 (after rebate)	Free until April 15 ($9.95 to ship head-start version; $3.95 to ship final version); $69.95 thereafter	Head-start version, $12.00; final version, $19.00	$79.95	$69.95
User interface	DOS	DOS, Microsoft Windows	DOS, Microsoft Windows	DOS, Microsoft Windows	DOS	DOS, Microsoft Windows
Professional version available	■	□	□	□	■	■
Mouse support	□	■	■	■	□	■
Context-sensitive help	■	■	■	■	□	■
Software Features						
Pop-up calculator	■	■	■	■	■	■
Built-in-notepad	■	■	■	■	□	■
Interview feature	□	■	■	■	□	■
"Shoebox" feature	□	■	■	■	□	■
"What if" analysis	■	■	■	■	□	■
Packages from which product automatically extracts data	AM-Tax (1992)	TaxCut (1992), TurboTax for Windows (1992)	EasyTax (1992)	Money Counts, Personal Tax Edge (1992)	None	Quicken, TurboTax (1992)
Imported file formats	None	ASCII, .FOX, .PRN, .TAX, .TXF	ASCII, .PRN, .QIF, .TXF	ASCII, .TXF	None	ASCII, .TAX, .TXF
Tax Help						
On-line tax-saving tips	□	■	■	■	□	■
On-line IRS instructions	■	■	■	■	□	■
Tax planning for 1994	■	■	■	■	□	■
Audits final return	■	■	■	■	■	■
Compares return with a national average	■	■	■	■	□	■
Can import and update entries from last year's return	■	■	■	■	■	■
Forms Preparation						
Number of forms, schedules, and worksheets included	63	95	■	60	48	106
State versions available	AZ, CA, CO, CT, DC, GA, IL, IN, KS, KY, MA, MD, MI, MN, MO, NC, NJ, NY, OH, OK, PA, SC, VA, WI	AZ, CA, CO, CT, DC, FL, GA, IL, IN, MA, MD, MI, MN, MS, NC, NJ, NY, OH, OR, PA, TN, VA, WI	AL, AZ, CA, CO, CT, FL, GA, IA, IL, IN, KS, KY, LA, MA, MD, MI, MN, MO, NC, NJ, NY, OH, OK, OR, PA, SC, TN, UT, VA, WI	DC and all states except AK, FL, HI, NV, SD, TN, TX, WA, WI, WY	None	DOS version: DC and all states except AK, NV, SD, TX, WA, WY; Windows version: AL, AZ, CA, CO, CT, DC, GA, IL, MA, MD,MI, MN, MO, NC, NJ, NY, OH, OR, PA, VA
Cost per state version	$29.00	$29.95	$19.95	$19.00	N/A	$39.95
Filing						
Prints IRS-approved forms	■	■	■	■	■	■
Prints IRS replica forms	■	■	■	■	■	■
Supports dot matrix printers	■	■	■	■	■	■
Supports HP LaserJet printers	■	■	■	■	■	■
Supports PostScript printers	□	□	□	■	□	□
Supports electronic filing	■	■	■	■	■	■
Supports filing in 1040PC format	□	■	■	■	□	■
Technical Support						
Phone/fax number	■■	■■	■□	■□	■■	■■ (both toll-free)
On-line forum	□	■	■	■	□	■

N/A—Not applicable: The product does not have this feature

Will the IRS question your tax return?

Every year, the IRS writes back to about 5 million taxpayers who thought they were done with their taxes!

ORDER TURBOTAX NOW FOR PROMPT DELIVERY!

Every year millions of taxpayers make calculation errors. Put figures on the wrong lines. Don't file all the correct forms. Will you be one of them?

You can greatly reduce your chances of making mistakes by preparing your taxes with TurboTax® for your PC. Or MacInTax® for your Macintosh. It's America's top tax software. Order it now **and we'll rush it to you right away — even faster if you order by phone.**

The IRS will check your return by computer. So you need TurboTax!

IRS computers are programmed to maximize revenue. So when they check your return for accuracy, they do NOT look to see that you've taken every deduction you are entitled to. That's why you need TurboTax — it looks for the deductions you may have missed. *It's programmed to help you minimize taxes.*

TurboTax puts every number on the proper line on the proper form — eliminating transcription errors. TurboTax does all the calculations and checks for accuracy and consistency (the way IRS computers do). TurboTax even flags you if some of your deductions exceed normal IRS guidelines and so you won't trigger an IRS audit.

Save time.

TurboTax acts like a tax professional and asks you questions, in plain English. The EasyStep® system is with you every step of the way. You never get tangled up in IRS instructions. TurboTax prints over 100 IRS-approved forms, schedules and worksheets on your laser or dot matrix printer, including forms the IRS didn't send you.

Do it right.

TurboTax gives you the satisfaction of doing it yourself and doing it right. You can prepare your return accurately and completely in a few hours — in little more time than it would take to gather the information and present it to a preparer, maybe even less. YOU enter the data. Your computer does the work. You're in control every step of the way, and you have help at the push of a button!

"One of the tax savings suggestions enabled me to save over $1,000 — not a bad return on my investment."
R. Schwartz, Belle Mead, NJ

Our 5-point guarantee!

1. Guaranteed Easy to Use.
2. Guaranteed Accurate.
3. Guaranteed Complete.
4. Guaranteed Telephone Support.
5. Guaranteed Faster.

Recommended by PC Magazine!

TurboTax has won more awards, more rave reviews and more dedicated users than any other tax preparation software. Tax tips and advice from more than 100 accountants, tax analysts and senior programmers are built in. Program support is FREE by telephone!

PC Magazine said TurboTax "... is clearly the best of the 1992 tax programs." Try it for yourself this year — your money back if you don't agree! *Don't leave it to the last minute — mail the coupon now ... or better yet, phone!*

Free Bonus— Dinosaur Adventure!

Doing taxes the old way is for dinosaurs. Have fun with these dinosaurs instead! Your whole family will learn the real story of the dinosaurs. Includes full color, sound and motion video, two games, and encyclopedia For ages 3 and up, no CD-ROM player required. FREE with your order!

✔YES! Rush me TurboTax RISK-FREE!

Rush me Turbo Tax ASAP, and charge my first monthly payment of $9.99 to my credit card below. For each of the three months thereafter, charge me an additional installment of $9.99. RISK-FREE: If I don't like it for any reason, I'll just send it back by April 15, 1994 and my payments will be refunded.

4 monthly payments $9.99 plus S&H

❑ TurboTax for Windows™ ❑ TurboTax for DOS ❑ MacInTax for Macintosh
❑ 3 1/2" disks ❑ 5 1/4" disks ❑ high density ❑ low density

Name

Address

City State Zip

Daytime phone (in case of ordering problem)

Bill my: ❑ VISA ❑ MC ❑ Discover ❑ Amex
I understand that $7.00 shipping will be added to my first payment.

Card # Expiration Date

Signature

❑ Payment enclosed (check or money order) for the full amount payable to ChipSoft (add $7.00 S&H plus sales tax as shown below).

MacInTax requires Macintosh Plus, System 6.0.5 or higher, hard drive. TurboTax requires IBM PC, XT, AT, PS/1, PS/2 or compatible, DOS 3.0 or higher, 640K RAM, hard drive. TurboTax for Windows requires Windows 3.1 or higher, 2MB RAM, hard drive. Offer expires 4/15/94 – not valid with any other offer. ®TurboTax, MacInTax and EasyStep are registered trademarks of ChipSoft Inc. Other trademarks are the sole property of their respective owners. **AZ residents add 5%, CA residents add 7.25%, FL residents add 6% sales tax. Please add $7.00 shipping and handling per order. *Retail customers: to receive your free gift, attach a copy of TurboTax sales receipt and enclose $7.00 for shipping and handling. Total price of TurboTax is $39.96.

For Faster Service Call: 1-800-964-1040 ext. E345

Or mail your order to: ChipSoft, 2650 E. Elvira Rd., #100, Tucson, AZ 85706

ChipSoft

plicated laws more comprehensible, TaxCut's Navigator outshines them in thoroughness, flexibility, and accessibility of help.

THE THIRD DEGREE

The Navigator's opening screen displays 18 graphics running down the side that illustrate the logical steps of tax preparation. Click on the For Self-Employed graphic, for example, and on-screen directions lay out your options. You go down the list of subtopics in that category, such as Home Office and Vehicle Expenses, reading the questions at the top of the screen and clicking on the Q&A button whenever you run across one that applies to you. When that occurs, you'll pop to the Q&A screen. You read the questions and explanations there, filling in data where required. You can choose to see either the current form or a fuller explanation of the question. When you finish, return to the Navigator and continue.

The screen can get pretty cluttered, but experimenting with the navigational buttons will help you determine where to go next. Simply click the Next Topic or Previous Topic button, or go back to the beginning and click on the desired graphic.

Though the DOS version's Navigator feature lacks the elegant graphics of its Windows counterpart, all the same tools are there—as is one minor annoyance: It is difficult to simply close a form, since there is no Close option on the menu, and no control bar.

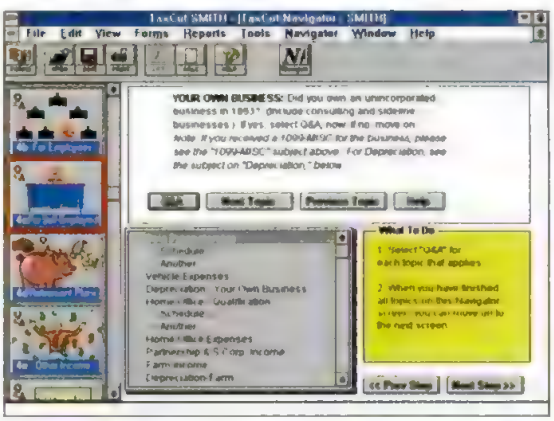
FILLING OUT

TaxCut's ShoeBox feature lets you approach your tax forms from a fresh angle by listing tax-related items and linking you to the relevant forms. It's arranged quite logically. The first column of text lists people and places from whom or which you might have received a form. As you scroll down, a column of text to the right of the screen lists the actual documents that the highlighted party would have issued. Click on Go There and TaxCut will take you directly to the correct form and line.

Any time you want to jump to a complete form, pull down the Forms menu and select from the list offered. Here, too, TaxCut provides navigational assistance, though it's more subtle than the assistance offered by the Navigator. For example, hit Ctrl-J on any field and you'll see a list of any fields on other related forms or schedules, as well as a list of forms you've recently visited. Click on one and you're there.

HELP FOR ALL

You also have access to IRS instructions, and the Help menu—besides offering general program and tax help—has a Find Tax Form By Subject option. Click on the desired subject and you're whisked to the form. Furthermore, the Explain Tax Form feature produces a brief explanation of every line on any current form.



TaxCut's Navigator helps you zero in on the documents you must complete; click on Q&A and you are guided through the questions.

TaxCut also helps you keep detailed itemizations of many line items, even where they're not required on the IRS forms. Worksheets—which can be toggled on and off—appear frequently throughout the forms. You can attach notes to lines and create your own itemizations, but if you're trying to itemize a field that requires a calculated value, you'll be asked whether you want to override that.

When you're ready to review your return, the Auditor feature will search all of your work for deductions you might have overlooked and seek data fields that have been omitted or look incomplete. It will then compare your return with national averages. Furthermore, the Auditor now sports a new look that's more than a simple cosmetic change. When you click on one of the flagged entries in the top half of the screen, the appropriate form appears below, so you can quickly make changes.

Also, the new Review Your Entries feature offers a comprehensive look at everything you've entered. It provides a scrolling list at the top of the screen; click on an entry and you'll see its matching form below, where you can make changes. When you've finalized your return, you can print it in IRS-approved and IRS replica forms, or use TaxCut's built-in communications software to file it electronically.

BIG PLANS

MECA Software plans even more changes for TaxCut's final edition. The Navigator screens are being cleaned up to reduce confusion and simplify product operation. Depreciation will be easier to calculate thanks to additional information and explanations. A new tax-planning feature will be incorporated. A separate edition of the program, Andrew Tobias' TaxCut CD-ROM/Multimedia, will offer video clips of TaxCut developer Dan Caine talking about taxes. Also in that edition, the Navigator's opening-screen graphics will be animated when you click on them. And in the Windows and the Multimedia versions, users with sound cards will be able to hear program directions from the new on-screen Tax Assistant.

TaxCut has taken a giant step this year, just as TurboTax did last year with its new EasyStep interface. TaxCut's improvements cover not only appearance and usability, but also features that help users understand income-tax preparation, minimize their tax liability, and prepare for next year's decisions. It offers myriad tools for inexperienced users, while allowing more experienced filers to bypass them. Its advice is sound and abundant, and its look and tone help take some of the nail biting out of preparing for April 15.

▶FACT FILE

Andrew Tobias' TaxCut for DOS
Andrew Tobias' TaxCut for Windows
MECA Software Inc., 55 Walls Dr., Fairfield, CT 06430-0912; 800-288-6322, 203-256-5000; fax, 203-255-6300.
Circle 454 on reader service card

We didn't sleep through the PC revolution.

We took notes.

t. Better results.

tame even the power-hungriest graphics, multimedia and scientific programs.

Okay, other members of your workgroup may not give a hoot about MHz, PCI or RISC. But they will like being able to create graphics, access CD ROM applications or pull information from anywhere in the network—all at once—without breaking stride.

MICROSOFT® WINDOWS™ READY-TO-RUN

DOS,™ OS/2,™ UNIX,™ Windows or whatever, you can be sure your DECpc XL will run it fastest.

They're even priced to go fast. None of this good stuff would mean very much if it cost a fortune. So maybe the best news of all is that you can get an i486 pc XL starting from $2,599.

Or you can pay *more* for a box that runs slower, won't accept both Alpha AXP and Pentium processors, doesn't have a high-speed PCI bus, and can't be upgraded over lunch.

We don't think you'll need an XL to figure that one out.

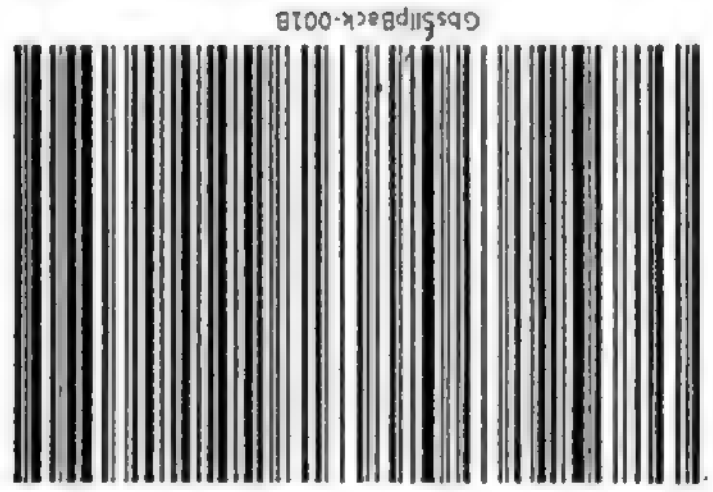
too. Not just the

rson using it.

Fact is, each DECpc XL is powerful enough to function as a small workgroup server all by itself. Even with multi-tasking operating systems like WindowsNT.™

But whatever operating system you're already using,

MICROSOFT® WINDOWS NT™ READY-TO-RUN



Back

1. Follow instructions on the other side

Inverted Back

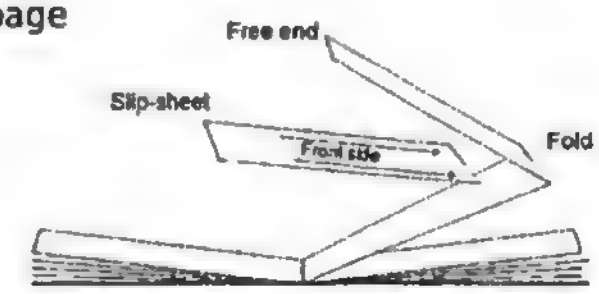
1. Follow instructions on the other side

Folded edge of the page

GbsSlipSheet-001

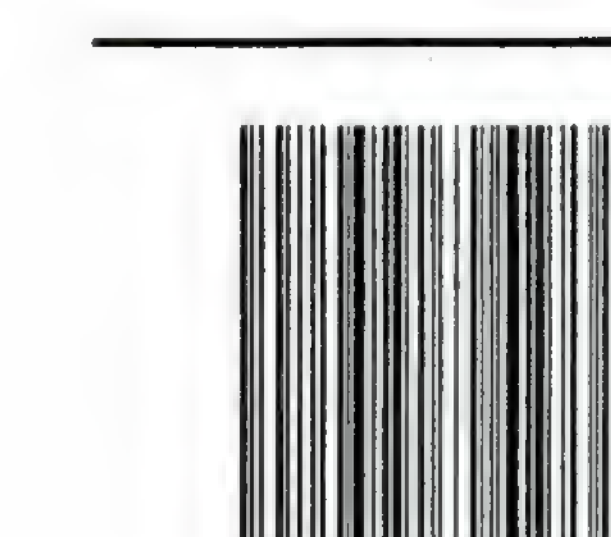
Foldout slip-sheet

1. Open the foldout page
2. Insert this sheet with
    1. Front side touching the free page
    2. Arrow pointing to the fold
3. Slice the folded edge
4. Close the page and slip-sheet



Inverted Foldout slip-sheet

1. Open the foldout page
2. Insert this sheet with
    1. Front side touching the free page
    2. Arrow pointing to the fold
3. Slice the folded edge
4. Close the page and slip-sheet



Greater outpu

Grind. Log. Print. Crunch. Search. Write. Fax. Import. Share. Send.

Our new DECpc XL helps you perform better no matter how many balls you're juggling.

Download. Create. Revise. Edit. Link. Upload. Receive. View. Review.

And it'll help you keep them all going at once while dropping nary a one.

So you don't just get a better box, you get a better return on your investment.

It's one line you won't have to wait on. The new DECpc XL is available in four models—from 33MHz i486 on up to 66MHz Pentium processors.

Of course, that's just clock speed. In real life—like on your desk—you can expect to leave ordinary boxes in the dust.

That's because our XLs *already* take full advantage of the new industry standard high-speed PCI local bus. This unburdens your processor, unleashing its full power.

That means sluggish applications start to fly. High-speed peripherals kick into high gear.

And graphics? On XL, your

Faster,

charts and images will pop up on screen *faster than on any other PC* in the land. That's because the DECpc XL is rated at more than 80 million WINMarks.*

but the per

And, of course, when you've got a really fast-moving PC, you can run faster, too. Ain't technology grand?

All the power a power-user can use. With up to 192MB of RAM and lightning reflexes, your XL can

Introducing the

We've noticed a lot of companies sell really fast PCs that aren't really very fast.

Not once you load them up with Windows™ or put them on your network.

To us, none of this makes sense.

What does make sense are our four new DECpc XLs.

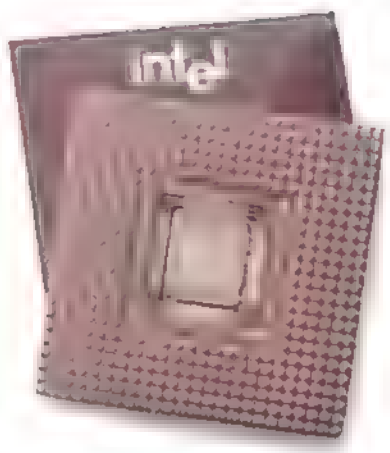
like blazes (in other words, 32 bits at up to 33MHz) while handling all the peripheral folderol that the processor used to.

We also put in write-back cache to speed the processor even more.

The result? You spend a lot more time working, and a lot less watching an hourglass icon. But

We took our time.

Performance you don't have to wait for. Our XLs use the same hot i486™ and Pentium™ processors others give you. But in an XL, these run a whole lot faster.



In fact, our new XL series includes the fastest i486 *and* Pentium processor-based PCs on the market today. Period.

That's because the CPUs are mated to the new PCI local bus—the new industry standard that runs

what if someday you need more?

How about a quick upgrade to say...150MHz? Our XLs give you room for more memory and hotter video right off the showroom floor. And when you're ready for more speed, just plug in a *daughtercard.*

waste yours.

This little marvel lets you *completely replace* your i486 chip with a Pentium processor—not merely add a Pentium OverDrive™ processor like the

DECpc™ XL series.

other guys do—in nothing flat.

If this still isn't enough for you, then plug in a 150MHz Alpha AXP daughtercard. You'll have big daddy RISC workstation and server capabilities, just like that.

Can a hot chip run too hot? Not on the XL, it can't.

Its *intelligent fan cooling* directs air when and where it's needed most. So XL uses less power and runs quieter with any chip.

Plus, XL already comes with bi-level 5/3.3 volt power for today's and tomorrow's processor technologies.

"Best system overall." Those are *PC Week*'s words*—not ours—for the DECpc XL with Pentium processor.

So what's the lesson in all this?

So we wouldn't

Simple. You may want to run your PCs in a hurry. But that's certainly no way to build them.

*November 15, 1993

digital™

PC

Beyond the box.

Is it any wonder we're the largest direct-order computer supplier in the world? Yes, even bigger than IBM, Dell, Compaq or Gateway.

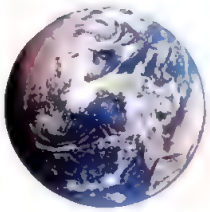
First, your purchase is backed with a 30-day, no-questions-asked guarantee. If you don't like it, it's history.

Then, your system is supported by Digital's full three-year† warranty. And for one full year, we'll support your DOS, Windows or WindowsNT operating system, too.

And wherever you do business, we have over 30,000 service representatives around the world to see that you're satisfied.

So just tell us which system you want. And if you don't see what you need on these pages, call anyway. We'll custom-configure a system to your needs and budget, and get it to you before you know it.

Don't waste another minute, call today.



With PCs this fast, we wouldn't want to keep you waiting.

1 800 215-8766

Please reference BNM when you call. 8:30 a.m. to 8:00 p.m., Mon.–Fri. ET. Call us for ordering information or for the name of your local Digital reseller.

*Based on October 1993 BAPCo and WINbench tests. †Three-year limited hardware warranty. Certain restrictions and exclusions apply. Warranty service on PC notebooks is return-to-factory. Monitors, batteries and peripherals covered by a one-year warranty.

Of course, a DECpc XL may be a little too hot for some tastes. That's why we have a complete line of value-priced i486 PCs with the same reliability and quality engineering we packed into our XLs—for as little as $1,348. For other Digital PC models from notebooks on up, see back of the next page.

XL,

By thinking beyond the box, we put some great thinking into the box. And obviously, we're not the only ones who think so.

BEST OF BYTE COMDEX Fall '93 Finalist

intel inside pentium™ PROCESSOR

i486 processor-based PC

DECpc XL 433dx

- i486DX/33MHz
- 128KB cache
- 8MB RAM
- 340MB SCSI hard drive
- 3.5" 1.44MB floppy drive
- On-board PCI SCSI-II
- S3 928PCI Video Adapter
- MS-DOS and Windows
- Upgradable to Pentium OverDrive,™ full Pentium processor and Alpha AXP processors
- Easy-access enclosure

$2,599* *$91/mo. lease*

Pentium processor-based PC

DECpc XL 560

- 60MHz Pentium processor
  256KB cache

$3,699* *$129/mo. lease*

*Optional monitor and CD-ROM not included in this price.

digital™ PC

Beyond the box.

Whatever your specs, we've got a PC to fit them. Call us on it.

NOTEBOOKS
Modular notebooks that let you upgrade processors, disk drives, screens and more.

NEW!

25MHz i486 SE (mono) **$1,899** **25MHz i486 SE** (color) **$2,599** **Lease for as low as $67/month**	4MB RAM (expandable to 20MB) 120MB hard drive 1 PCMCIA Type III slot	3.5" floppy drive 8KB cache MS-DOS and Windows Embedded Numeric Keypad NiMH battery Advanced power management AC adapter Snap-on trackball
33MHz i486SLC Premium (color) **$4,399** **Lease for as low as $154/month**	4MB RAM (expandable to 32MB) 200MB removable hard drive 1 PCMCIA Type III slot, or 2 Type I or Type II slots	

LPv+ SYSTEMS
Energy Star compliant systems.

NEW!

25MHz i486SX **$1,348** **33MHz i486SX** **$1,448** **33MHz i486DX** **$1,698** **50MHz i486DX2** **$1,798** **66MHz i486DX2** **$2,098** **Lease for as low as $47/month**	Local bus SVGA video GUI accelerator 4MB RAM S3 805 1MB video RAM 170MB hard drive 3 ISA slots 4 drive bays	OverDrive processor upgrade 3.5" floppy drive 14" SVGA(i) color monitor MS-DOS and Windows Mouse 101-key keyboard Energy Star compliance

LPx SYSTEMS
Value-priced performance and expandability.

33MHz i486SX **$1,598** **33MHz i486DX** **$1,848** **50MHz i486DX2** **$1,948** **66MHz i486DX2** **$2,248** **Lease for as low as $56/month**	VESA-VL bus GUI accelerator 4MB RAM S3 805 1MB video RAM adapter 170MB hard drive 6 ISA slots (2 VESA-VL slots) 5 drive bays OverDrive processor upgrade	Pentium™ OverDrive processor upgrade 3.5" floppy drive 14" SVGA(i) color monitor MS-DOS and Windows Mouse 101-key keyboard

MTE SYSTEMS
The only desktop PC you can get with both EISA and VESA-VL buses.

33MHz i486DX **$2,698** **66MHz i486DX2** **$2,998** **Lease for as low as $94/month**	6 EISA slots with 1 VESA-VL Local bus SVGA video slot GUI accelerator 8MB RAM 128KB cache 1MB video RAM 245MB hard drive 5 drive bays 3.5" floppy drive	Pentium OverDrive processor upgrade 14" SVGA(i) color monitor S3 805 video adapter MS-DOS and Windows Mouse 101-key keyboard

DECEMBER 1993 BYTE

XL SYSTEMS
Alpha and Pentium processor upgradable.

NEW!

33MHz i486DX **$2,599** **66MHz i486DX2** **$2,999** **60MHz Pentium** **$3,699** **66MHz Pentium** **$4,299** **Lease for as low as $91/month**	8MB RAM (expandable to 192MB on board) 340MB SCSI hard drive 3.5" 1.44MB floppy drive Double-speed SCSI CD-ROM* S3 928PCI video adapter 1MB video RAM (expandable to 2MB) 15" SVGA, LE, NI color monitor*	6 slots (2 PCI, 3 ISA, 1 ISA/PCI interleaved) 128/256KB cache 5 drive bays On-board PCI SCSI-II MS-DOS and Windows Upgradable to Pentium OverDrive, full Pentium and Alpha AXP processors

*Optional. Not included in price

1 800 215-8766

Please reference BNM when you call. 8:30 a.m. to 8:00 p.m., Mon.–Fri. ET.
Call us for ordering information or for the name of your local Digital reseller.

© DIGITAL EQUIPMENT CORPORATION, 1993. The DIGITAL logo, DECpc and AXP are trademarks of the Digital Equipment Corporation. Beyond the Box is a service mark of the Digital Equipment Corporation. OverDrive, Pentium, i486 and the Intel Inside logo are trademarks of Intel Corporation. Windows is a trademark and MS-DOS is a registered trademark of Microsoft Corporation. Digital believes that the information in this advertisement is accurate as of its publication date; such information is subject to change without notice. Digital is not responsible for any errors. Actual monitor may differ from that shown. Not all products available worldwide.

digital PC
Beyond the box.

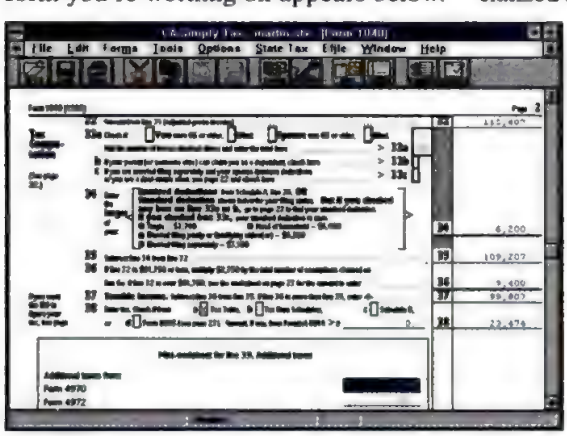
Computer Associates International Inc.

CA-Simply Tax for DOS
CA-Simply Tax for Windows

Computer Associates International blasted its way into the tax preparation software market this year when it bought Softkey Software Products' DOS-based EasyTax, added an interview feature, and produced an almost identical Windows version. CA-Simply Tax is being "sold" for the cost of shipping ($9.95 for the head-start version and $3.95 for the final version). Though CA-Simply Tax does not yet match the accessibility or interface maturity offered by market leaders Andrew Tobias' TaxCut and TurboTax, it does offer a similar set of tax tools.

FORM FILLERS

Like those competitors, CA-Simply Tax presents a three-pronged approach to tax preparation: interview, direct data entry, and shoebox. The Tax Prep Interview feature, a hybrid of the interview features found in the other major tax packages, asks questions about your financial situation in a box at the top of the screen. The form you're working on appears below.



Icons that let you itemize a field, link to a supporting form, and the like are easily accessible in CA-Simply Tax.

Occasionally, the package instructs you to click the Forms button to move to a supporting worksheet and enter any pertinent data there. Moving between interview sections is simple.

With direct data entry, you move through forms, entering information in whatever order you choose. You can temporarily jump to a supporting form or schedule when you encounter a protected field that's calculated elsewhere. If you're in an unprotected field, you can click on the Itemize button to create a list. A calculator and memo pad help you further document your work, and several worksheets are built in.

The Shoebox feature—designed to help you link tax-related items to the appropriate forms—contains a comprehensive list of tax documents and subjects. If you're unsure where a particular receipt or document belongs, just find it in the list, click on it, and you're there. Two variations of the Shoebox offer alternative ways to place missing pieces. Locate Tax Categories lists tax-related elements such as Car Expense and Business Property; highlight one to see its related forms. Locate Tax Forms displays related tax categories for every form.

SUITABILITY TO TASK

CA-Simply Tax for DOS
CA-Simply Tax for Windows

	POWER	EASE
Preparation	Good	Good
Guidance	Good	Good
Filing	Good	Good

HELPFUL CLUES

A list of IRS instructions contains highlighted words and phrases to activate hypertext help. You'll also have several specialized help options: Getting Started, for the basics of completing a tax return; Helpful Hints, for situations requiring you to complete a form; Quick Tour; Cross-Reference, for the origin of data in a field; and Tax Help, for up-to-date tax-law changes. Other options include: U.S. Averages; Tax Calendar, with form-completion deadlines; Tax Tips, with more than 60 commonly overlooked deductions; Year-End Strategies, for reducing tax liability; and Clinton Tax Law Guide, for more tax-saving tips.

While CA-Simply Tax's tools and help strategies are plentiful, they're scattered all over the program. This is unfortunate, since without smoothly integrated guidance, you'll never cut a straight path in tax preparation.

FOLLOWING UP

When you've completed your return, you can run an audit to see if anything is missing. This function zeros in primarily on data omissions and excessive deductions. Following the audit, you can either print your return in an IRS-approved format or file it electronically.

We did find one bug in CA-Simply Tax: When we were in the interview in the Windows version and tried to add information about an IRA deduction after entering a lot of other data, the program crashed, and we had to complete our work via direct data entry. Computer Associates reports that the problem has only been reported by a few people—primarily those who use 486DX-based PCs—and the company is confident that the problem will be resolved in the final version.

Computer Associates has built well on the foundation established by its core product, EasyTax. Should this growth and refinement continue, CA-Simply Tax may well be worthy competition for the top contenders in this field.

▶FACT FILE

CA-Simply Tax for DOS
CA-Simply Tax for Windows
Computer Associates International Inc., One Computer Associates Plaza, Islandia, NY 11788-7000; 800-225-5224, 516-342-5224; fax, 516-342-5734.
Circle 455 on reader service card

Parsons Technology Inc.

Personal Tax Edge for DOS
Personal Tax Edge for Windows

Parsons Technology's Personal Tax Edge ($12 for the head-start version, $19 for the final version) has always been a solid blend of tax preparation tools in a somewhat quirky DOS interface. As such, it's never been able to quite catch up with the tax powerhouses, but this year's Windows version may change that. It's a definite front-runner, comparable with the traditional leaders in terms of tax preparation tools, and its interface is both sleek and unobtrusive. One may view its simplicity as an asset, one that diminishes the confusion associated with the fragmented

process of tax preparation.

Both the DOS and Windows versions offer the same three approaches to tax preparation: direct data entry, interview, and shoebox (called the Organizer). Though direct data entry might appear to be the riskiest option if you know little about taxes, Personal Tax Edge supplies a host of visual signals and tools to guide you. Color-coding and a status-bar description indicate entry-field type. Dark red means the field is protected; data is entered from elsewhere. Blue means the field is a program-calculated value, or one that's brought in from another form but can be overridden. Green means the field is all yours. Fields you've overridden appear in bright red. And black signifies edit mode. You can also designate a field as an estimate and return to it later.

WHO SAYS FLOWCHARTS ARE HARD?

GET FLOW CHARTING™ 3

If team members drag their feet when it comes to creating flowcharts, you need Flow Charting 3. Its straightforward, no-nonsense approach makes it easy to learn, yet powerful to use.

A must in today's competitive world, flowcharts are essential to documenting, steamlining, and improving processes and procedures. Flow Charting 3 lets you:

- Chart fast with "Hot-Keys" or mouse
- Put shapes, lines and text anywhere you want them
- Create unlimited custom shapes
- Print boardroom perfect charts on dot matrix and laser printers
- Access context-sensitive, on-line help
- Use on a LAN— share files, set up work groups, access usage reports
- Import and export between other popular programs

And Flow Charting 3 is backed with unparalleled post-buy support including free unlimited technical support, free subscription to "The Flow Charter™", access to valuable flowcharting resources, and a full 90-day, no-risk guarantee.

See your dealer today, or for a full interactive demo disk, call now:

800-525-0082 Ext. 233

PATTON & PATTON

Excellence in charting the flow of ideas!

485 Cochrane Circle, Morgan Hill, CA 95037-9932 408-778-6557 Fax: 408-778-9972

All company and product names are trademarks or registered trademarks of their respective companies.

CIRCLE 301 ON READER SERVICE CARD

Should you choose the interview option, you won't find the depth of guidance that you'll find in Andrew Tobias' TaxCut. But you will find less confusion about what your next move should be. But while other products split the screen between the question box and the form—so you can watch as your answers are transferred to the form—Personal Tax Edge's question box takes up the entire screen. During the interview procedure, you answer questions until you reach a point where your answer would actually appear on a form or schedule. Then the appropriate document pops up, and on-screen instructions tell you to fill in a specific line and click the Continue button to go back to the interview.

The Organizer is similar to the shoebox features in CA-Simply Tax, TaxCut, and TurboTax. But where the other packages provide lists of items—including documents, people, and topics—the Organizer provides only a list of documents you might have received, such as your 1099 or W-2 form. And even that list is not comprehensive. You select the form from the Organizer's list, and you fill it out on-line just as you received it. The Organizer takes all pertinent information—such as salary—and puts it in the appropriate forms and schedules. Then you must complete your forms via direct data entry or the interview.

SUITABILITY TO TASK

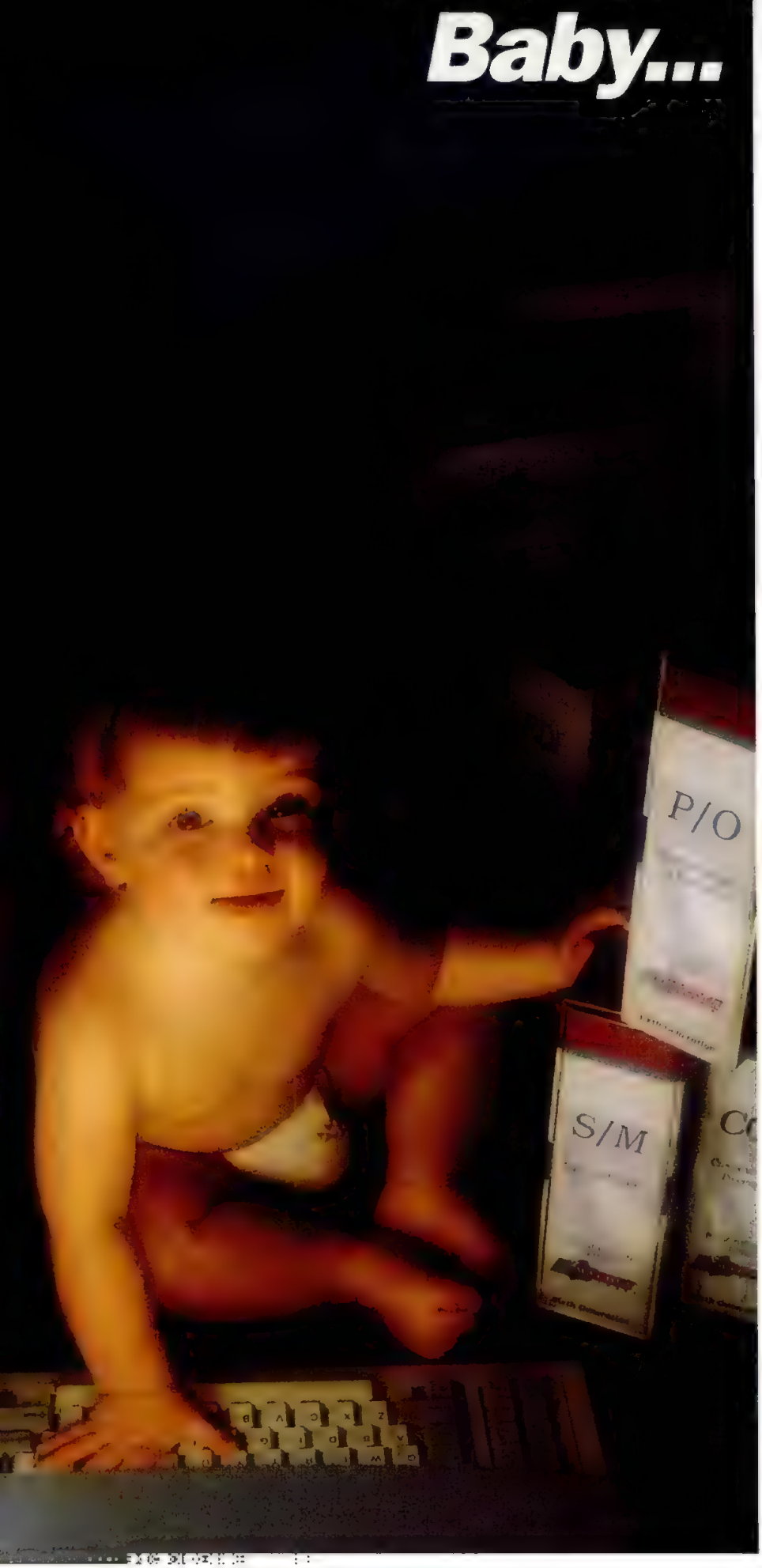
Personal Tax Edge for DOS
Personal Tax Edge for Windows

	POWER	EASE
Preparation	Good	Good
Guidance	Excellent	Excellent
Filing	Good	Good

TAX AID

Three levels of help are at your fingertips whenever you reach a line you don't understand: program help, IRS Instructions, and Tax Tips. The latter pinpoints which fields must be filled in and provides tax-savings strategies. A Tax Law Update supplies a detailed explanation of this year's tax laws.

Personal Tax Edge's on-line tools minimize the tax-time clutter on your desk. The Bookkeeper feature lets you itemize figures on a line. The Note feature lets you add a note as a backup to a particular answer. Math and depreciation calculators



YOU'RE THE BEST!

That's what users tell us when we ask them about Macola Accounting Software.

Of course, they're not the only ones who rave — *PC Magazine* and Price Waterhouse also recognize Macola Accounting Software as the best. In fact, for the fourth consecutive review, Macola has earned an "Editors' Choice" for LAN-based Accounting.

'87 '89 '91 PC MAGAZINE EDITORS' CHOICE
October 26, 1993
Macola Progression 5.0

If you're looking for accounting software that will grow with your company, call for a FREE copy of Macola's review kit. See for yourself why "our baby" is the best! Call today:

1-800-468-0834

MACOLA® SOFTWARE

CIRCLE 263 ON READER SERVICE CARD

Accounting Software You'll Never Outgrow!

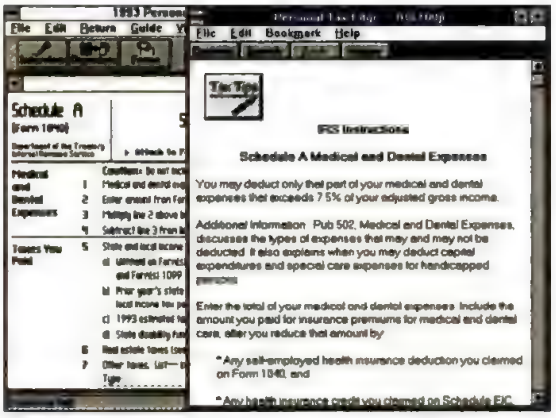
tally numbers and transfer them to the current form. The Interest Vision SE performs more advanced numeric manipulations than those calculators, and it generates amortization and accumulation schedules.

Personal Tax Edge is more flexible about screen-navigation options than its peers. You can hit Enter, Tab, or the cursor keys to move from one field to another in a form.

LAST, NOT LEAST

Personal Tax Edge offers an audit feature that checks your return. Though it generally only finds fields that have been omitted and alerts you to overridden data that you might want to recheck, it occasionally catches discrepancies in your answers that might result in an IRS penalty. Other pre-filing options let you compare your return with last year's, as well as with national averages. You can also compare the merits of filing separately against the merits of filing jointly with your spouse. And a feature called Tax Savers makes money-saving suggestions specific to your situation.

Only draft-mode printing was available in the head-start version of Personal Tax Edge, so we weren't able to test its ability to produce IRS-approved forms. The final version, with Postscript and TrueType support, should be able to print both IRS-approved and IRS replica forms. It should also allow electronic filing.



IRS instructions and tax tips are close at hand in Parsons Technology's Personal Tax Edge.

KEEPING PACE

Like the other top contenders in this group, Parsons has added features to Personal Tax Edge judiciously. Both versions now incorporate capabilities previously found in their competitors, such as support for the 1040PC format and data import using the .TXF standard. There's also a guarantee that IRS penalties related to computational errors caused by the software will be paid by Parsons. Furthermore, tax-guidance systems have been fine-tuned, offering more tax-saving strategies within the help system, a revised interview procedure, and more advice for minimizing tax liability.

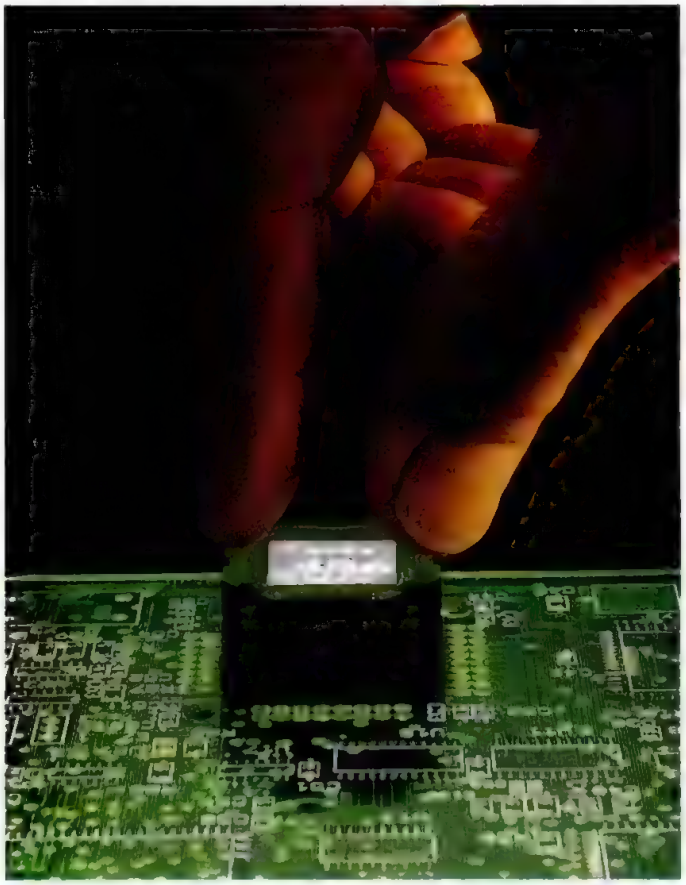
Personal Tax Edge has traditionally been an also-ran in the race for dominance in the tax preparation software market. This year, it may have caught up.

▶FACT FILE

Personal Tax Edge for DOS
Personal Tax Edge for Windows
Parsons Technology Inc., One Parsons Dr., P.O. Box 100, Hiawatha, IA 52233-0100; 800-223-6925, 319-395-9626; fax, 319-395-7449.

Circle 456 on reader service card

To make your 386 run like a 486, just push here.



Financial Services Marketing Corp.

TaxPerfect Personal 1040

TaxPerfect Personal 1040 ($79.95) is one of the few products in this group that can still be used by people with minimal hardware. It's a fast, bare-bones package with a generous selection of forms and schedules and an uncomplicated interface that you can learn in minutes. While Financial Services Marketing Corp. has some exciting modifications in the works for the 1993 final version, the head-start version offers no more than it did last year in terms of on-line help, evaluation and planning tips, and interpretation of tax law.

DIRECT DATA ENTRY

TaxPerfect doesn't offer multiple approaches to data entry as do most of its competitors; your only option is the direct method. But rather than filling the entire screen, the data entry area is confined to a small window that's positioned smack in the middle of the screen. There you scroll through a list of entries, filling in the blank field when a particular line applies to you.

Any field that requires a supporting form or schedule is marked with a *C*, and the name of the required document is provided. For a list of supplied forms, hit F5, scroll to the proper one, and hit Enter. When you've completed your form or schedule, F6 returns you to the previous document. A list of forms and schedules you've worked on appears in the upper-left-hand corner of the main screen. And there's a running tally of the major totals on your return (Adjusted Gross Income, Total Tax, and Credits, for example) on the right side of the screen.

SUITABILITY TO TASK

TaxPerfect Personal 1040

	POWER	EASE
Preparation	Fair	Fair
Guidance	Poor	Poor
Filing	Good	Good

TAXING HELP

Sadly, little on-screen help is offered. There's no interpretation of what's being asked for on a specific line and no verbatim IRS instructions. TaxPerfect's written documentation does offer a brief explanation of IRS forms and schedules calculated by the program, however. You can also get this information by pressing F10 when the cursor is on the desired form in the forms list. Pressing F9 with that list running pops up a tree-like illustration of how individual forms and schedules interact with each other.

There's also an auditing feature called DataChek. Like most other programs' audit features, it simply checks for missing data and questions deduction claims that seem high.

Other help options are accessed from TaxPerfect's pull-down menus (which only appear when you hit the Esc key and disappear again after you've taken some action or pressed Esc once more). You can perform standard operations—such as printing IRS-approved forms—through these menus. Furthermore, you can get help on program commands and

To your applications, it's more like a shove. Because in one simple, economical and quick operation, an anemic 386 can now run like a screaming 486.

Amazing? Yes. Smart? Of course. Breakthrough? Absolutely.

But we prefer to call it the Cyrix 386-to-486 Upgrade Microprocessor.

No more waiting. No more coffee breaks between commands. Just your applications running faster than ever possible on a 386.

You get increased throughput, more end-user productivity and with Clock Doubling, internal cache and enhanced 486 technology, even applications running under Windows are no match. And all without having to invest in new machines.

So, you see, your 386 computers can be spared. But at what price?

Well, starting at $269, certainly not a high one. Especially when compared to the cost of buying a 486 computer.

And not only do you get to hold on to your computers, you get to hold on to your software. Our upgrade is fully compatible with DOS, OS/2, UNIX, Windows and even Windows NT.

And of course, it's certified software compatible in Novell, Banyan and LAN Manager nodes.

Installation couldn't be easier. The Cyrix 386-to-486 Upgrade Microprocessor simply snaps on top of, or plugs in instead of, your current 386 microprocessor—depending on which model you require.

All in all, it takes about fifteen minutes. Who needs downtime? Can we back all this up? Absolutely.

With our limited lifetime warranty and toll-free telephone support, we've got all the bases, and soon all the chips, covered. So what are you waiting for? Your applications to open?

To get your hands on our Upgrade Microprocessor, just call any dealer. If they don't have it, they can order it. Or call us directly at 1-800-46-CYRIX for the dealer nearest you.

A quick recap: You get to keep your computers.

Virtually double their speed. At one fifth the cost of replacement. There. Another smarter alternative from Cyrix. The smarter microprocessor company.

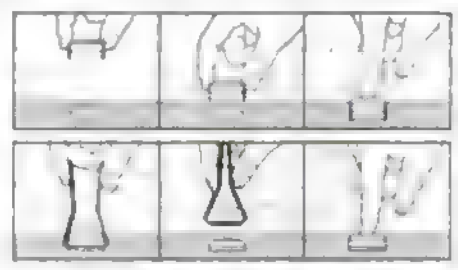
And a push in the right direction for 386 computers everywhere.

Performance Benchmarks

(figures indicate relative performance)	Intel i386	Cyrix 486 Upgrade
MS Excel 3.0	1.0x	2.1x
MS Word 2.0	1.0x	2.0x
Micrografx Designer 3.1	1.0x	2.6x

Benchmark tests run on IBM PS/2 Model 70/20MHz

What kind of performance boost will you get? Depends on the 386 model you have, and your applications. But tests show performance ranges from 30% to well over 100%. As the lawyers say, your actual mileage may vary.



On DX versions, use the chip removal tool (included) to take out the existing chip, and plug in the Cyrix Upgrade Microprocessor. On an SX, just snap into place right over the existing chip. All in all, it takes just 15 minutes—roughly the same amount of time as a coffee break.

Cyrix instead

© 1994 Cyrix Corporation. Cyrix is a registered trademark, and Cyrix instead is a trademark of Cyrix Corporation. All other brand or product names are trademarks or registered trademarks of their respective holders.

CIRCLE 037 ON READER SERVICE CARD

navigation, view the current form (although you can't enter data directly on it), and get instructions for electronic filing.

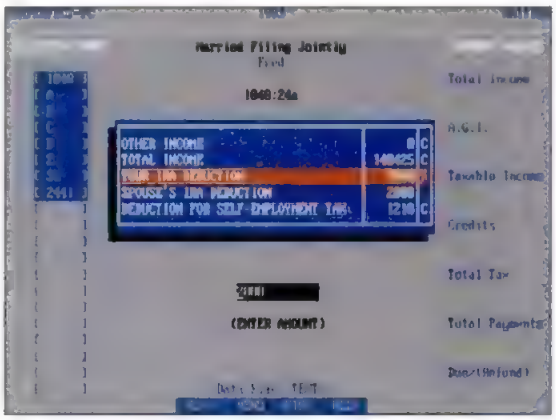
A FEW ADDITIONS

TaxPerfect's final edition is expected to embody several functional differences within a revamped interface: The 28 worksheets and the IRS instructions that will be added correct the serious problems that handicapped the effectiveness of the head-start version we reviewed. The program will also support mouse navigation and will automatically recalculate forms and schedules after each entry. Also, rather than having to manually request a view of a full form, you'll work directly on the real thing, entering your responses in the fields themselves. The use of the function keys will be spelled out for you across the bottom of the screen. And pull-down menus will remain on-screen.

These anticipated enhancements will certainly help justify TaxPerfect's top-of-the-line price, making it a more palatable choice for taxpayers who don't have the hardware to run a fuller-featured package.

▶FACT FILE

TaxPerfect Personal 1040
Financial Services Marketing Corp., 500 N. Dallas Bank Tower, 12900 Preston Rd., Dallas, TX 75230; 800-525-5611, 214-386-6320; fax, 214-386-6323.
Circle 457 on reader service card



Supply your answers in the appropriate fields and TaxPerfect will fill in the correct forms for you.

ChipSoft Inc.

TurboTax for DOS
TurboTax for Windows

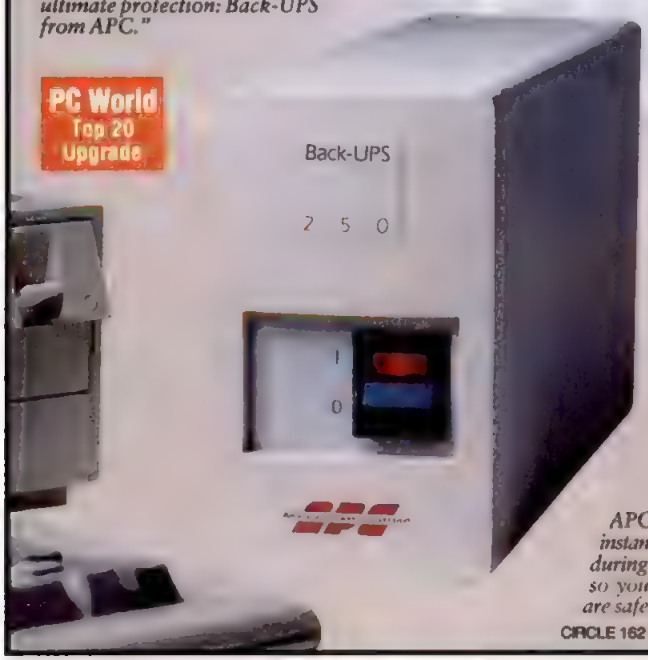
In the new DOS and Windows versions of TurboTax ($69.95), ChipSoft has made a strong effort to tighten features while expanding their depth and comprehensiveness. The products now feature streamlined interview navigation as well as new strategies for helping you hold onto some of your dollars. There's a Deduction Finder feature, as well as clearer explanations of confusing topics such as depreciation and real estate. The new Windows version also resolves printing glitches.

All the same, little has been changed about the look, feel, and operation of either version of TurboTax since last year. Both still offer the interview (EasyStep), direct data entry (Classic), and shoebox (File Cabinet) approaches to tax preparation. The File Cabinet, like the Organizer in Personal Tax Edge and the shoebox

Introducing the $139 investment no computer user can afford to be without...

"Don't take chances...Get the ultimate protection: Back-UPS from APC."

PC World Top 20 Upgrade



Call for your FREE 60 page PC power protection handbook!

Blackouts, brownouts, sags... if you use computers, your bottom line is directly linked to your power line. The fact is, your data and hardware are vulnerable to problems that surge suppressors and power directors just aren't equipped to handle.

Now there's an Uninterruptible Power Supply (UPS) to suit any budget. Back-UPS® are perfect protection for LAN servers, personal computers, phone/fax systems, POS equipment, or any other device that can go down when the power does. If lightning is a concern, Back-UPS are even backed by a $25,000 insurance policy against surge damage to your equipment (see details).

So don't wait for the inevitable power problem to rob your business. Protect your productivity with Back-UPS, available where quality computer products are sold.

APC

AMERICAN POWER CONVERSION

800-800-4APC, dept. E4

Businessweek's #1 Hot Growth Company!(NASDAQ:APCC)

APC Back-UPS provide instantaneous battery power during power disturbances, so your data and hardware are safe!

CIRCLE 162 ON READER SERVICE CARD

© 1993 Trademarks are property of their respective owners. * Suggested list price

More computer users prefer to keep their important data safe and sound on 3M diskettes than any other brand. That's because inside and out, each diskette is built for reliability and tested for 100% error-free performance. Just what you expect from the world's leading manufacturer of diskettes.

Whether you use 2 megabyte diskettes or 21 megabyte Floptical® diskettes, you can depend on 3M. That's why more businesses protect important information on 3M data storage products than any other brand in the world. For more information call 1-800-888-1889, ext. 56.

The most preferred safe deposit box.

features in Andrew Tobias' TaxCut and CA-Simply Tax, lists tax elements and links you to appropriate forms.

STEPPING THROUGH

During the EasyStep procedure, a box at the top of the screen asks questions about your personal situation; your answers supply basic information required by the IRS and determine whether particular documents need to be filled out. If you indicate that you've had medical and dental expenses, for example, EasyStep will walk you through Schedule A, probing for possible personal deductions and filling your answers in the correct fields on the form below. In this manner, you can glide through your tax return by just answering yes/no questions and filling in figures. But you can also revisit topics by pulling up lists of topics and subtopics and clicking on the one you want.

TurboTax's File Cabinet might come in handy if you've finished your form entry and still have some miscellaneous paperwork that hasn't been entered anywhere. This feature offers dozens of income and expense topics. Click on one and up pops the appropriate form or schedule, as well as specific descriptions of the pertinent rules. You'll also find this feature especially helpful if you're using direct data entry.

CHECKING IT TWICE

You can comb your completed return in a number of ways, both to get a visual overview and to see if anything's amiss.

SUITABILITY TO TASK

TurboTax for DOS
TurboTax for Windows

	POWER	EASE
Preparation	Excellent	Good
Guidance	Good	Excellent
Filing	Excellent	Excellent

New this year is the Deduction Finder, which alerts you to declared expenses that you've missed, based on those commonly reported in the forms and schedules you have used. Also new are Tax Graphs, charts that illustrate four different analyses of your tax situation: Income Sources, Deductions, Cash Flow, and Tax Analysis. Though these graphs don't provide any information that you can't find by looking at the relevant numbers, the impact of graphical presentation may make this data more immediately meaningful.

You can also do an error scan, searching through the list of active forms to find any marked "Not Done." Open one, keep pressing F7 to find questionable or missing lines, and fill them in. Or you can run the Final Review feature, which looks for missing or incomplete entries, as well as for potential audit triggers and errors. Final Review offers tax-saving suggestions and lists overrides, itemized statements, and notes. It also notifies you if you're eligible to file a 1040PC form and compares your itemized deductions with national averages. By comparison, TaxCut's audit feature is more accessible: It shows you the form as it's pointing out the entry that needs checking. And although TurboTax doesn't have a feature like TaxCut's Review Your Entries, TaxCut doesn't have a Deduction Finder.

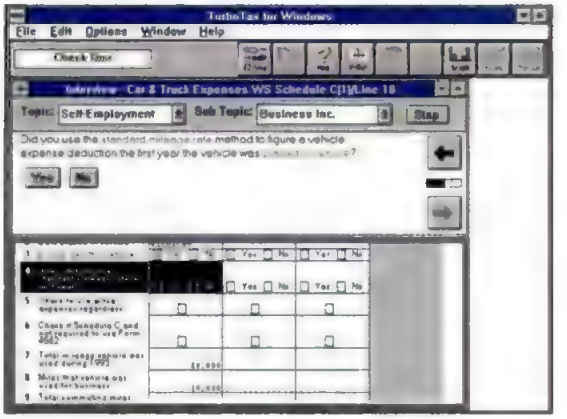
SOUNDMAN® WAVE: GENUINELY BETTER SOUND, FULLY LOADED.

Maybe you've read* how *wavetable synthesis* uses actual recordings of instruments to create synthesized sounds. And how fantastic it sounds versus regular *FM synthesis*. Well it's true. SoundMan Wave lets gamers rock and roll with the real thing for an affordable price. *And* it comes loaded with great software like MCS MusicRack™, BeSTspeech®, and ReadOut™.

COMPLETE COMPATIBILITY GUARANTEE.

SoundMan Wave's Yamaha OPL4 chip is completely compatible with the AdLib/Sound Blaster standard so it is backed by a 100% money-back compatibility guarantee, *and* we'll give $500 to the first

Users who experienced printing problems with last year's TurboTax for Windows will be glad to know that this year's system has been simplified. It now supports TrueType fonts rather than requiring users to install fonts or choose specific graphics files. Unfortunately, this means Windows 3.0 users will be unable to print TurboTax's IRS-approved and IRS replica forms. ChipSoft's electronic filing will still be available to all users, though.



TurboTax's EasyStep interview asks you clear questions and fills in your answers on the appropriate forms.

CONSTRUCTIVE HELP

No matter what method you use to fill out your forms, you'll have access to all the same help tools. To help clarify complex IRS language, TurboTax provides verbatim IRS text instructions via its Instruct icon (unavailable until the final version) and more coherent explanations via its Tax Help icon. It also refers you to more detailed IRS publications where warranted. Program help is available. Further, you can itemize figures and store notes relating to your work.

At press time, ChipSoft was planning a January 1994 release of a CD-ROM version of TurboTax for Windows called TurboTax Deluxe, which includes a video tax guide along with J.K. Lasser's *Your Income Tax*, an up-to-date reference detailing personal tax strategies.

The Windows version of TurboTax retains some irritating interface quirks. For example, forms and schedules do not fill up the entire screen, and they can't be maximized to do so. This can be especially troublesome on high-resolution screens. Also, to see a copy of a Schedule C or E, you have to pull up a summary first, then click in a small area of one column to get to the actual schedule behind it. It usually takes several tries to find the magical spot that opens the form.

This year's TurboTax did not attempt major alterations to the intuitive interface introduced last year; indeed, it had little reason to. Most of this year's changes—all welcome—are more subtle and less far-reaching. The bottom line: After all these years of dominance in its field, TurboTax succeeds again—by being what it's been all along: a dependable, thorough, and understandable friend at tax time.□

▶FACT FILE

TurboTax for DOS
TurboTax for Windows
ChipSoft Inc., 6339 Nancy Ridge Dr., #103, San Diego, CA 92121-3290; 800-964-1040; fax, 800-756-1040.
Circle 458 on reader service card

YOU'VE HEARD US TOOT OUR HORN.

person that comes across a game with which it isn't fully Sound Blaster compatible. Right now, hot games like X-wing, 7th Guest, Doom and Space Quest 5 already take full advantage of our wave technology. Dozens more are expected to hit the market each month.

LOGITECH
The Sensewave Company

DON'T BELIEVE US? CALL NOW FOR OUR FREE *SOUND ADVICE* AUDIO CD AND GET A $10 REBATE.

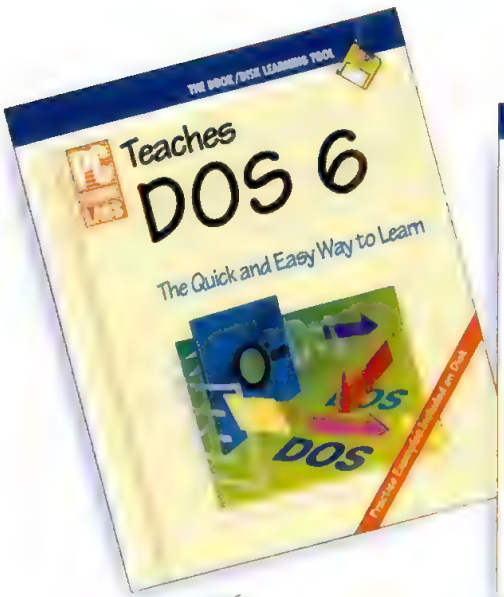
Listen to expert advice about adding sound to PCs, and hear for yourself the incredible difference between SoundMan Wave and run-of-the-mill 16-bit boards. Call for our *Sound Advice* Audio CD before supplies run out, and we'll enclose a $10 rebate coupon:

1-800-889-0058, OFFER #5L.

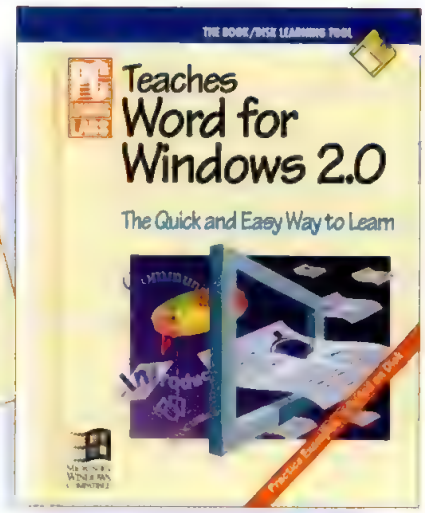
*See PC Magazine 12/21/93 p.95
™/®—properties of registered owners

CIRCLE 182 ON READER SERVICE CARD

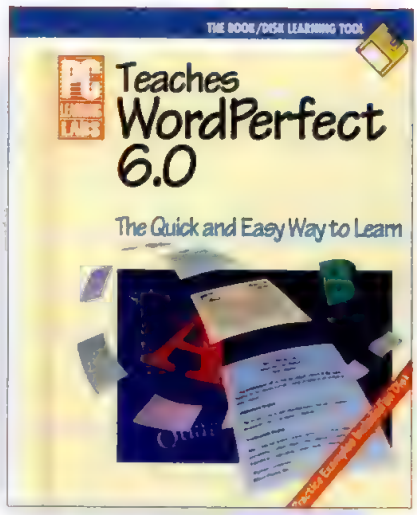
The Quick and Ea



ISBN: 100-5
Price: $22.95



ISBN: 065-3
Price: $22.95



ISBN: 105-6
Price: $22.95

We know that PC Learning Labs books are the fastest and easiest way for beginners to learn because years have been spent perfecting them.

The techniques contained in these books have been tested on thousands of first-time users in the classrooms of PC Learning Labs, one of the largest single-site training centers in the world. We listened to their feedback and made numerous refinements until we found the most effective way to learn. The result is a carefully tailored book/disk learning system that features easy-to-follow practice sessions and easy-to-find reference information.

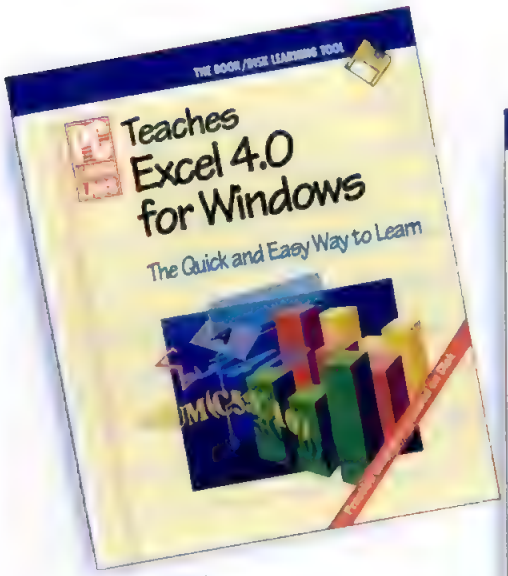
"... will take a novice and move him/her up to speed quickly."

—Barry Mishkind, *Radio World*, reviewing *PC Learning Labs Teaches DOS*

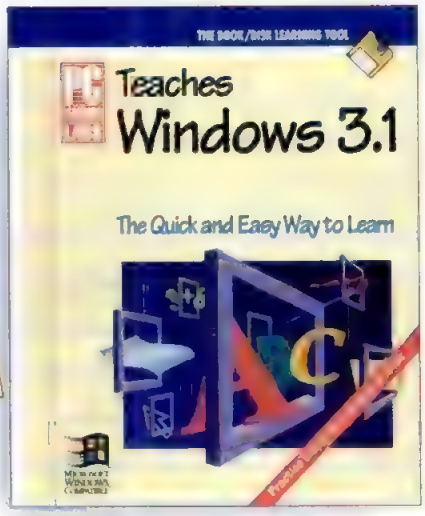
"... a tightly focused book that doesn't stray from its purpose ... it concentrates on the beginner, and it stays with the beginner."

—William J. Lynott, *Online Today*, reviewing *PC Learning Labs Teaches WordPerfect for Windows*

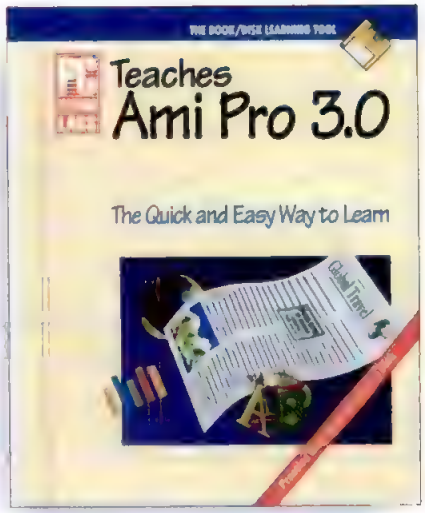
sy Way to Learn.



ISBN: 074-2
Price: $22.95



ISBN: 051-3
Price: $22.95



ISBN: 134-X
Price: $22.95

They are the smart choice for people who are serious about getting the most from today's software. You can feel confident using them or recommending them.

The time we spent designing this series results in time saved for you. So take advantage of our hard work and get your hands on PC Learning Labs—you'll be amazed at how quick and easy learning can be.

Available at all fine bookstores, or call

1-800-688-0448, ext. 8566

More PC Learning Labs books are available at your local bookstore. Call for a free catalog. Quantity discounts available.

"This book from an organization with 10 years of classroom teaching of personal-computer operation under its belt makes the learning process both easier and organized. It's like having a personal teacher . . . you will emerge a confident user of personal computers . . ."

—Hugh Anderson, *The Gazette*, reviewing *PC Learning Labs Teaches DOS*

ZIFF-DAVIS ZD PRESS

© 1993 Ziff-Davis Press

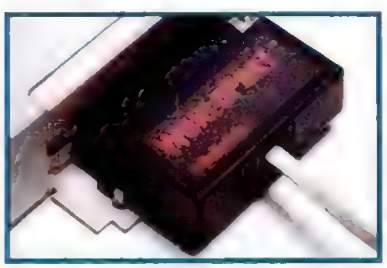
A PCMCIA Modem Is A Lot Like An Oreo®.

The Stuff That Matters Is Inside.

Anyone can whip up a modem with an off-the-shelf chip set and someone else's technology. In fact, that's exactly what most PCMCIA manufacturers do. The WorldPort,™ however, is no cookie-cutter modem.

Inside every high-speed WorldPort is U.S. Robotics' Courier® DSP-based technology. The same modem technology implemented by major companies like CompuServe, DuPont, General Electric and U.S. West. This core technology makes the WorldPort fast, accurate and easy to use.

The WorldPort runs at fax or data speeds up to 14,400 bps. (57,600 bps with data compression.) And with QuickConnect,™ a U.S.Robotics' exclusive, it handshakes and gets to work in under 10 seconds.



Only the WorldPort features the revolutionary SmartPlug,™ eliminating the need for an adapter. And, unlike modems with built-in phone jacks, there are no exposed wires. The WorldPort is internationally approved for use in over 21 countries.

With Adaptive Speed Leveling (ASL),™ another USR exclusive, the WorldPort makes the most of inconsistent phone lines, slowing down for bad connections, and speeding right up again when conditions improve.

The WorldPort is also highly intuitive. The setup is easy. The commands are flexible. It's *very* easy to use.

Getting the WorldPort is easy, too. It's just $399, including fax and communication software.

WORLDPORT™

1-800-DIAL-USR

U.S.Robotics®

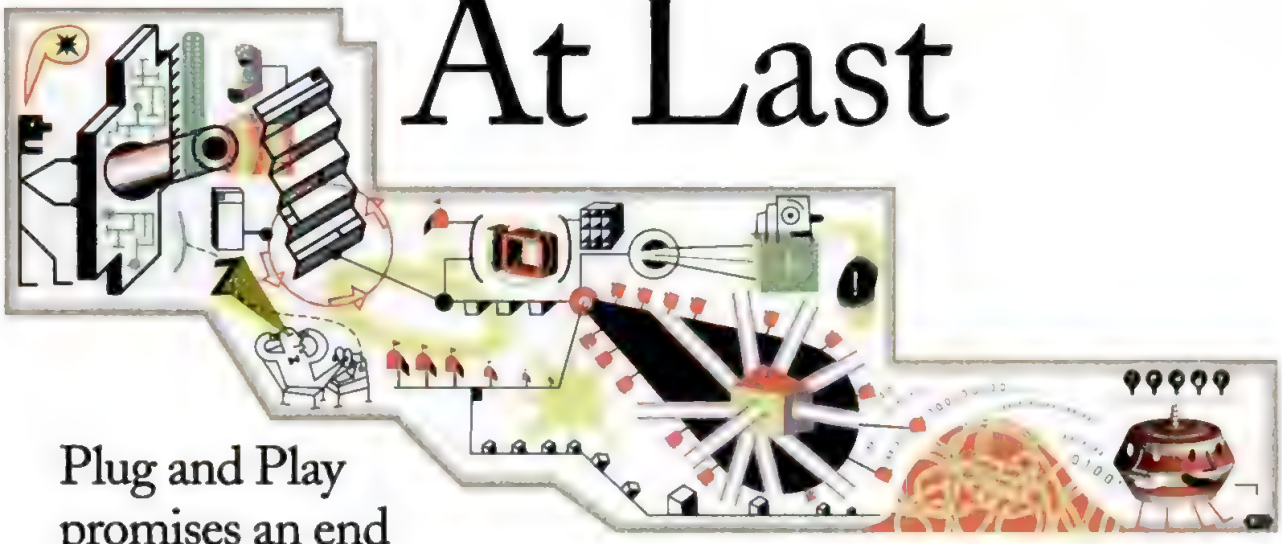
The Intelligent Choice in Data Communications

If you'd like to know more about the WorldPort and what it can do for you, call 1-800-DIAL-USR today.

U.S. Robotics and the USRobotics logo are registered trademarks of U.S. Robotics, Inc. WorldPort, ASL (Adaptive Speed Leveling), QuickConnect and SmartPlug are trademarks of U.S. Robotics. Oreo® is a registered trademark of NABISCO FOODS, Inc.

CIRCLE 920 ON READER SERVICE CARD

Plug and Play: Easy Upgrades At Last



Plug and Play promises an end to the configuration hassles that have always plagued PCs. And unlike previous attempts, it's compatible with existing hardware and boasts widespread industry support.

by Howard Alexander

Expanding your system is rarely a simple task. Try to add an expansion card and you'll often have to fuss with DIP switches and jumpers to select one or more available DMA channels, IRQ lines, and I/O addresses. That's *if* you can scout out settings that aren't already used by other devices in your system; if not, you'll be reduced to mere guesswork. The multimedia upgrade kit you brought home on Friday could easily keep you busy all weekend as you pore over oblique documentation and lament the absence of seven-day-a-week technical support. During it all, you might wonder: Why can't installing an expansion card in your PC be as simple as adding a tape deck to your component stereo system?

Macintosh users will be quick to point out that for their machines, it *is* almost that easy. But for the vast majority of PC users, configuration hassles can be a significant problem. Microsoft estimates that nearly half of its technical support calls relate to hardware

Illustrations by John Hersey

installation problems. And according to CompUSA, a quarter of all sound cards are returned because of unsuccessful installations.

Last year four companies proposed a workable solution to PC configuration problems. Compaq Computer Corp., Intel Corp., and Microsoft Corp., along with BIOS manufacturer Phoenix Technologies, released the first version of their Plug and Play specification. Plug and Play, or PnP, defines a means for peripherals to communicate with a machine's BIOS and operating system and resolve resource conflicts with little user intervention.

In practical terms, complete implementation of PnP means that DIP switches and jumpers will be obviated. You won't have to worry about arcana like DMAs and IRQs; expansion cards will be configured invisibly and automatically. Many of these capabilities are already an integral part of PCI (Peripheral Component Interconnect) expansion cards; the PnP specification extends similar autoconfiguration techniques to the ISA bus and eventually the EISA, VL-Bus, and Micro Channel buses.

Future versions of Plug and Play will address other thorny peripheral configuration problems, including SCSI setup, PCMCIA hot-swapping, and notebook hot-docking. (Hot-swap capabilities will let systems recognize and use PCMCIA cards as soon as they are plugged in rather than requiring a reboot first; similarly, hot-docking will enable portable computers to access devices in a docking station immediately on insertion.)

To gain all of Plug and Play's benefits, you'll need a BIOS, expansion cards, and an operating system designed to support it. But PnP will also work with your existing equipment to a limited extent: While you won't be able to automate configuration fully, it should become easier to identify and resolve conflicts. If you have a machine with a reprogrammable flash BIOS, you may even be able to download a new Plug and Play–compatible BIOS. Upgrading socketed BIOS ROMs is also possible.

VENDOR ENDORSEMENTS

Plug and Play will be one of the key building blocks of Windows 4.0 (also known as Chicago), along with true 32-bit multitasking, built-in SCSI drive support, and a new file system. Dozens of expansion-card manufacturers have announced support for Plug and Play, including Adaptec, Advanced Micro Devices, Creative Technology, DataBook, Diamond Computer Systems, Future Domain Corp., Intel, Matrox, and National Semiconductor. Many Plug and Play peripherals will hit the market when existing products go through their next revision. Because the added cost to implement Plug and Play capabilities is negligible, you shouldn't have to pay anything extra.

A number of system vendors have also expressed commitment to Plug and Play, among them Acer America, Advanced Logic Research, AST Research, Compaq Computer Corp., NCR, Packard Bell, and Texas Instruments. Early this year, BIOS vendors Phoenix Technologies and SystemSoft announced BIOSes that support Plug and Play capabilities.

Be aware, though, that manufacturers' intepretations of Plug and Play may differ, particularly in the early stages of implementation. One potential trouble spot: Machines with PCI buses automatically configure PCI peripherals, which may be enough for vendors to label their systems Plug and Play–compatible, even if autoconfiguration of ISA peripherals is not supported.

BETTER THAN BEFORE

Some of Plug and Play's features have been promised before. Most notably, the Micro Channel and EISA buses claimed to support autoconfiguration. But awkward setup routines, substantial added expense,

HIGHLIGHTS

Plug and Play

"PLUG AND PLAY" isn't just a marketing come-on anymore. A formafdl Plug and Play (PnP) specification from Compaq, Intel, Microsoft, and Phoenix Technologies defines automatic configuration techniques that promise to make system configuration simple. The first target is ISA expansion cards, but the standard will eventually encompass other buses—even SCSI and PCMCIA.

JUMPERS AND DIP SWITCHES will be a thing of the past on Plug and Play expansion cards. You won't have to worry about finding unused DMAs, IRQs, or I/O addresses; compliant cards will be configured automatically and transparently.

OLDER EXPANSION CARDS will still work in Plug and Play systems. They won't be configured automatically, but the software will give you instructions for choosing settings that prevent conflicts.

MOTHERBOARD BIOS EXTENSIONS are necessary to support Plug and Play capabilities (although Plug and Play cards will work in existing systems). New machines with PnP-enabled BIOSes will be commonplace later this year. Existing systems may be upgradable, either through downloadable BIOS upgrades (if you have a flash BIOS) or with replacement ROM chips.

NEGLIGIBLE COST of implementation is one of Plug and Play's highlights. Vendors shouldn't have any trouble making their products PnP-compliant, and the added hardware and software required is minimal enough that it shouldn't add anything to end-user prices.

MICROSOFT'S CHICAGO operating system—the next revision of Microsoft Windows—will provide integral support for Plug and Play products. Until then, configuration capabilities will be provided through add-on software that ships with compliant systems and adapter cards.

PCI INTRINSICALLY supports Plug and Play capabilities, but be careful: There's no guarantee that the system vendors have extended PnP functionality to the ISA bus.

limited acceptance in the marketplace, and in Micro Channel's case, physical incompatibility with existing hardware made these buses unappealing to many users.

Plug and Play's advantages are that it works with existing bus architectures, has a low implementation cost, and comes with widespread industry backing. Once it is incorporated into operating systems, it won't require you to keep separate configuration disks handy. (You may still have to insert a device driver disk during the installation of a Plug and Play peripheral, however.)

Plug and Play's most significant restriction: While it will resolve conflicts whenever possible, it cannot eliminate fundamental resource limitations imposed by the decade-old PC/AT architecture. Plug and Play won't add any new IRQ lines, DMA channels, or I/O addresses to your system, so if you add too many expansion cards, you'll still run out of options eventually. (Currently a typical 386 or 486 system leaves you with about five free IRQs and five free 8-/16-bit DMA channels.) And if you have two cards that both require the same resources, you can't swap between them on the fly; you'll have to choose which one to enable and leave the other one inactive.

For Plug and Play to work in its entirety, a number of pieces must fit together: the system BIOS, operating system, device drivers, and hardware devices themselves. The good thing is, these components work all but invisibly. Even on existing machines that can't support Plug and Play in full, configuration of expansion cards should get easier.

PUTTING THE PIECES TOGETHER

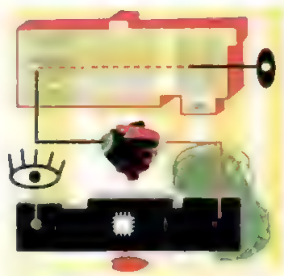
Plug and Play expansion cards require a special PLD (programmable logic device) or modifications to an existing ASIC (application-specific integrated circuit) to support basic handshaking functions. The PLD or ASIC lets the device communicate a unique identification number and list the resources it requires and can support. (Identification numbers are assigned by the BCPR Services clearinghouse in Spring, Texas—the same organization that assigns ID numbers for EISA card manufacturers.) The extra firmware required will be very inexpensive to implement—between $2 and $5 per ISA board, according to Intel—because 10,000 or so additional transistors are required, a small number by integrated circuit standards.

Device drivers must also be modified to support Plug and Play: Whereas existing device drivers expect hardware to be assigned specific resources unless explicitly instructed otherwise, Plug and Play device drivers register with the operating system each time the machine is booted. Then, when the operating system allocates resources to each device, it communicates configuration details to the device drivers. Intel reports that Plug and Play capabilities can be added with only ten lines of code—a trivial change.

Altering the system BIOS to support Plug and Play demands a bit more effort. A Plug and Play system BIOS must scan the system bus at bootup, polling Plug and Play devices for their identification numbers and resource allocations, and then, if a change is detected, either attempt to allocate system resources on its own or hand control over to the Plug and Play–enabled operating system. The Plug and Play BIOS must also be able to assign resources to system-level devices—including DMA, interrupt, memory, and keyboard controllers, as well as serial and parallel ports—on the fly. This dynamic allocation will permit future implementation of hot-swapping and hot-docking capabilities. Be aware, however: Existing software that talks directly to hardware (as many DOS-based games today do) may run into problems with this dynamic resource reassignment unless a workaround is provided.

The linchpin of a Plug and Play system is the Plug and Play–enabled operating system. The PnP-enabled OS will incorporate a number of new software elements to perform various configuration functions. The most important of these elements is the Configuration Manager, which manages the peripheral database and communication between all of the software and hardware elements in a Plug and Play system.

The next release of Windows, Chicago, will fully support Plug and Play—as will future versions of OS/2 and NetWare. Microsoft has not yet decided whether to support Plug and Play in MS-DOS 7.0, which is scheduled to ship late this year; however, IBM does plan to support Plug and Play in the successor to PC-DOS 6.1.



Plug and Play won't add any new IRQ lines, DMA channels, or I/O addresses to your system.

HOW IT WORKS

In an exclusively Plug and Play environment, device configuration occurs transparently. At bootup the system BIOS polls the system bus. If any configuration changes are detected, the BIOS either attempts to allocate resources on its own or reports the changes to the Configuration Manager, which then takes a number of steps to juggle resource assignments (see the illustration "How Plug and Play Works").

First, the Configuration Manager activates software that scans the expansion bus for the identification numbers of new devices and their resource and driver requirements. After all PnP boards have responded, another program assigns IRQs, memory addresses, and related resources to each device.

Whenever possible, Plug and Play devices are assigned their preferred resources. In the case of a conflict, however, all Plug and Play devices are reconfigured until a stable configuration is reached. At this point, the appropriate resource data is passed on to the device drivers, and the system finishes the boot sequence.

This process may take as little as 1 second if no new devices have been added to the system, or from 5 to 30 seconds if new devices have to be configured. Once a sta-

Our Contributors: HOWARD ALEXANDER is a freelance writer. LEON ERLANGER was the associate editor in charge of this story and MICHAEL J. ZULICH was the project leader.

Give your power-hungry soft

The OverDrive™ processor. The single-chip upgrade that maximizes your PC's performance.

Want to see a spectacular performance? Then add an Intel486™ DX2 OverDrive processor to your Intel486 SX or DX CPU-based system. And watch *all* your power-hungry software take off.

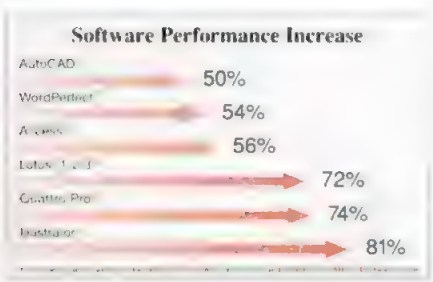
The OverDrive processor improves the performance of all your applications. So you can fly through your overwhelming workload with the greatest of ease.

How does the Intel486 DX2 OverDrive processor do it? Using Intel's innovative DX2 "speed doubling" technology, it runs internally at twice the speed of the rest of your system. So if you had a 33 MHz SX or DX Intel processor, you would now have a 66 MHz DX2 Intel processor.

***For European inquiries, call +44 (0) 793 431155, and ask for infopack IODI**

© 1994 Intel Corporation. AutoCAD is a registered trademark of Autodesk. Illustrator is a registered trademark of Adobe Systems Incorporated. Lotus 1-2-3 is a registered trademark of Lotus Development Corporation. Quattro Pro is a registered trademark of Borland International, Inc. Access is a trademark of Microsoft Corporation. WordPerfect is a registered trademark of WordPerfect Corporation.

ware up to 70% more ka-boom.



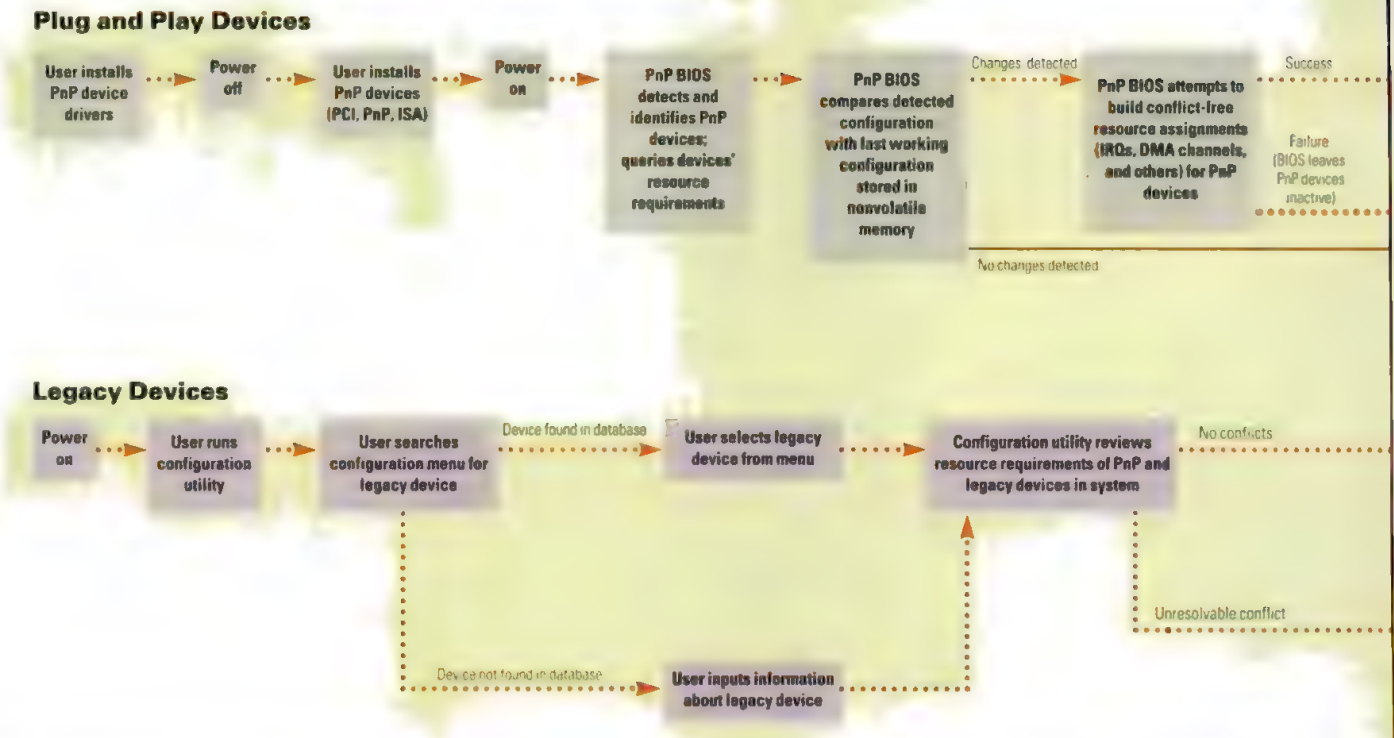
To install the Intel486 DX2 OverDrive processor, you can either plug it into the OverDrive socket or swap it with your original microprocessor, depending on your system design.

To get a better idea of how the OverDrive processor boosts performance of your software, call 1-800-354-3112, Ext. 5718,* for a free demo disk. It could be the greatest show on earth.

intel®

CIRCLE 363 ON READER SERVICE CARD

How Plug and Play Works



ble configuration is reached, configuration data can be stored in the motherboard's nonvolatile memory, and future boots will proceed at normal speed.

Where do the Configuration Manager and related software components come from? Many future operating systems, including Windows 4.0 (Chicago), will include them. Until then, the pieces will be packaged with Plug and Play systems and peripherals, much as device drivers are now. Intel has made a functional ISA Configuration Utility available as part of its Plug and Play developers' kits; some vendors will simply pass on the Intel product, while others may modify it to improve on its capabilities.

PLUG AND TELL

Many early Plug and Play–enabled systems will contain some *legacy* devices—existing expansion cards or peripherals that do not support Plug and Play. Intel calls its solution for these hybrid systems "Plug and Tell."

When you add a non-PnP device to a PnP-enabled system, you must run the Configuration Manager manually and select your peripheral from a database of legacy devices. (If your device is not on the list, you'll have to enter some information manually.) The Configuration Manager computes new resource allocations around the default requirements of the legacy card and stores this information in the system's nonvolatile memory. After you install the card and restart the system, the new allocations take effect.

If unresolvable conflicts arise, the Configuration Manager will provide instructions for changing the board's resource allocations. You'll still have to set jumpers or DIP switches, but at least all the guesswork will be removed. One limitation: The Configuration Manager can tell you which DMA or IRQ to set your board to, for instance, but it cannot tell you exactly which jumpers or switches to change. You'll still want to have your original manuals handy.

BACKWARD COMPATIBILITY

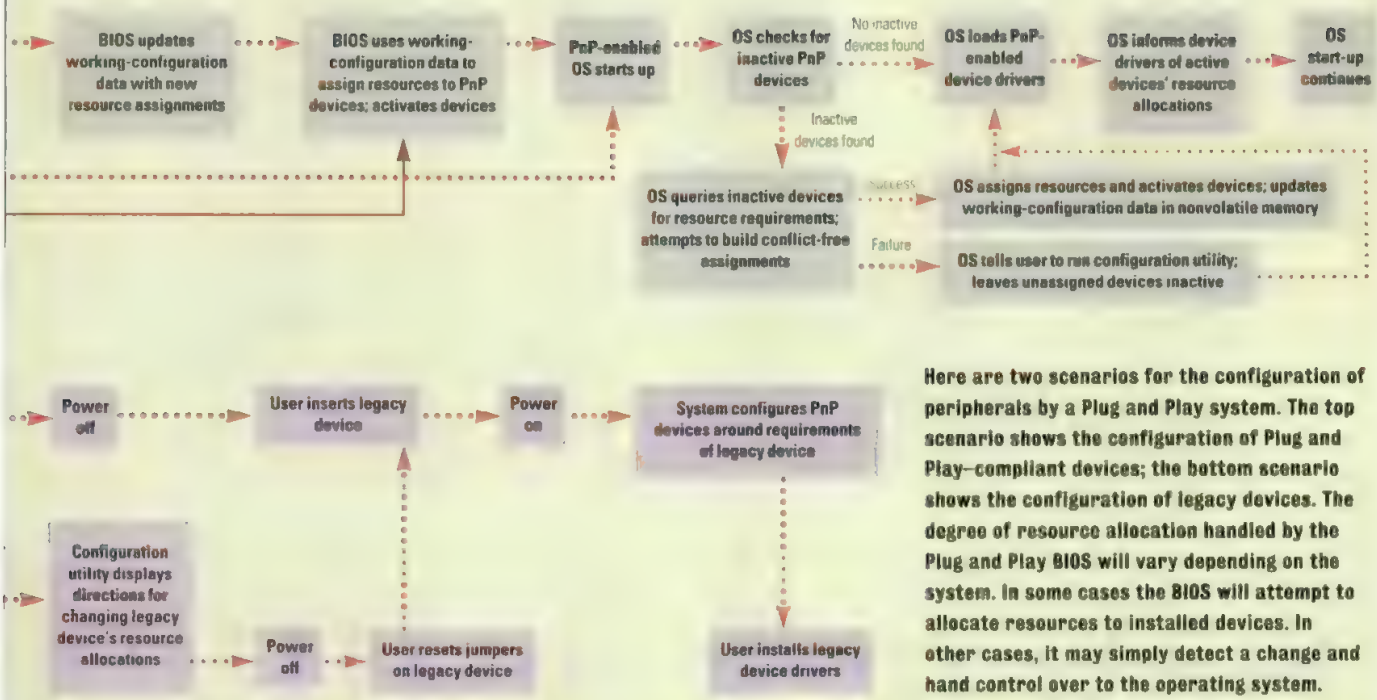
Plug and Play boards will also work on older, non-PnP-enabled motherboards. But their installation will not be quite as automated, because the system BIOS doesn't have the ability to run the Configuration Manager automatically.

On these older systems, the first step is to run the Configuration Manager and add data about legacy devices. Then, when you install a PnP peripheral, you must use the Configuration Manager to force the new device to begin its automatic configuration. Pre-PnP motherboards also don't contain nonvolatile memory for storing peripheral-configuration information, so this data will be stored on the hard disk instead.

Some older machines may support Plug and Play through BIOS upgrades. Acer, ALR, and Compaq, for instance, have indicated that they will provide flash BIOS updates that will enable existing systems to support Plug and Play. You may also be able to pop out an old ROM BIOS and replace it with a new, Plug and Play–enabled chip. However, there are many different OEM-specific versions of even such mainstream BIOSes as those from AMI and Phoenix, and it is likely that only major system vendors will sell upgrades to their BIOSes.

SCSI AND PCMCIA

Plug and Play SCSI host adapters will configure like any other board, but con-



Here are two scenarios for the configuration of peripherals by a Plug and Play system. The top scenario shows the configuration of Plug and Play–compliant devices; the bottom scenario shows the configuration of legacy devices. The degree of resource allocation handled by the Plug and Play BIOS will vary depending on the system. In some cases the BIOS will attempt to allocate resources to installed devices. In other cases, it may simply detect a change and hand control over to the operating system.

figuring the individual devices on the SCSI chain requires an extension to the basic Plug and Play scheme. Microsoft and SCSI adapter vendors have collaborated to produce just such an extension, which is called SCAM (SCSI Configuration Auto Magically). SCAM requires additional firmware on SCSI adapters and devices; during the boot process, a SCAM-compliant SCSI subsystem allocates SCSI addresses to avoid conflicts. SCAM also handles SCSI termination (that is, indication of which devices are at the ends of the SCSI chain). Older, non-SCAM-compliant devices still must be configured with software such as CorelSCSI or Adaptec's EZ-SCSI, updated to handle SCAM devices.

Plug and Play extensions to simplify PCMCIA configuration are in the works, and SystemSoft is already shipping a BIOS that claims universal PCMCIA compatibility (and provides hot-swapping capabilities) on top of Plug and Play compliance.

Plug and Play will eventually provide a mechanism for hardware to communicate configuration changes to device drivers (and from there to applications software). One possible use for this capability: forcing a notebook to save a file before it is ejected from a docking station.

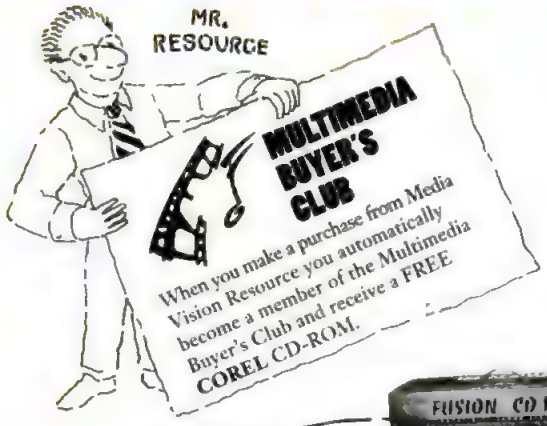
Plug and Play motherboards won't neglect the requirements of integrated devices, either. On-board PnP-compliant IDE, video, audio, and SCSI controllers will all be configured (and reconfigured to resolve any conflict) simply and automatically.

WILL IT WORK?

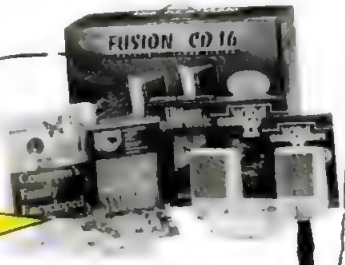
Until an operating system that intrinsically supports Plug and Play is available, most efforts to promote Plug and Play are being coordinated by Intel. Intel has three developers' kits, two of which it is providing free to help simplify the design of Plug and Play systems and peripherals. One kit, the Plug and Play ISA Hardware Demo Kit, contains a Plug and Play prototype card and descriptions for the circuitry required to implement Plug and Play firmware. Another one of Intel's kits is the Plug and Play for DOS and Windows Kit, which includes interface libraries, sample code, and a device driver developer's guide. Intel's Plug and Play BIOS Enhancement Kit contains the BIOS extensions necessary to support Plug and Play from the motherboard.

As we were writing this story, Plug and Play systems and products were just entering production, so we were unable to verify claims of easy installation in our labs. It's possible that Plug and Play, like previous unenforced standards, may not deliver everything that it has promised. And every new system has its share of bugs in early releases. No formal policing institution is currently in place, although Intel has indicated its willingness to coordinate a special interest group (SIG) that might provide validation services. Also, Microsoft will allow vendors to display the Windows 4.0/Chicago logo on products it finds to be Chicago-compatible, meaning in part that the systems support Plug and Play.

On the whole, Plug and Play shows plenty of potential: It has support from major industry players, is compatible with existing hardware, easy to use, and costs little to implement. If all the pieces come together, expanding your PC may indeed become as simple as plugging in a card and turning on the machine. □



IT'S NOT LUCK THAT GETS YOU THE BEST DEAL - IT'S MEDIA VISION RESOURCE!



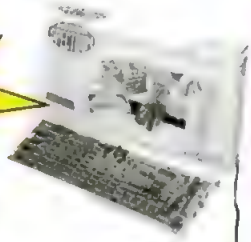
FUSION CD 16

$229

- An ideal multimedia starter kit
- Award-winning 16-bit PC sound card
- Top quality CD-ROM drive
- Amplified speakers
- Exciting software packages: Compton's Family Encyclopedia, Where in the World is Carmen Sandiego?, Ultima Underworld & Wing Commander II

PRO MOVIESPECTRUM

$99

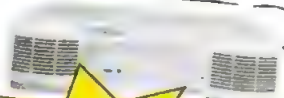


- Create professional desktop videos on your PC
- Smooth real-time capture at 30 frames per second up to 160 × 120
- Still-frame capture with resolutions of 320×240 & 640×480
- 32,768 vibrant colors

M.V. RESOURCE MULTIMEDIA KIT SPECIAL

SPECIAL $189

- A perfect starter Multimedia Upgrade Kit
- 8-bit sound card
- Double speed CD-ROM drive
- Amplified speakers
- **Five exciting additional CD-ROM titles for just $15.00!**



CDPC XL

$499

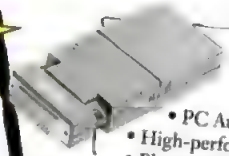
- The first complete, fully-integrated, multimedia solution
- Includes dual-speed CD-ROM drive, amplifier, speakers & MIDI
- Multisession Photo CD ready
- Brings high-quality sound to your PC with the best in 16-bit digital audio
- Includes 5 CD-ROM titles: Out of This World, Where in the World is Carmen Sandiego?, Compton's Multimedia Encyclopedia & Action!

PRO AUDIOSPECTRUM 16 FOR THE MAC

PAS NuBus $189

PAS 16 LC $179

- The ultimate in affordable sound upgrades
- True 16-bit sampling & playback, 4-channel input mixer, MIDI and headphones
- Easy installation



AUDIO PORT

$65

- PC Audio device
- High-performance portable module for PCs & notebooks
- Plugs into parallel port of any IBM PC/AT, PS/2 or notebook
- Transport Sound™ technology & built-in-speaker
- Headphone & external speaker outputs

- **Order instantly from experienced multimedia sales representatives**
- **30 day money back guarantee**
- **Toll free technical support 7 days a week**
- **Overnight delivery**
- **All major credit cards accepted**

Call 1-800-684-6699

International customers call (510) 770-8600
Monday thru Saturday, 6am to 6pm PST

© 1994 Media Vision, Inc., 47300 Bayside Parkway, Fremont, CA 94538. (510) 770-8600. Pro MovieSpectrum, CDPC XL, Fusion CD 16, Audio Port & Pro AudioSpectrum 16 for the Mac are all trademarks of Media Vision, Inc. Any other trademarks or registered trademarks are the property of their respective holders. Any and all bundled software and prices are subject to change without notice.

CIRCLE 130 ON READER SERVICE CARD

MEDIA VISION RESOURCE

Look below the surface of any company's "right-sizing" efforts and you'll probably find a powerful application server—the newest generation of information workhorse in the PC industry.

APPLICATION SERVERS

At Your Service

by Jim Seymour

Say the words *client/server* and savvy personal computer users smile and nod knowingly. Consultants reply in hushed whispers, turning the phrase into an almost-magical incantation. Information-system managers tell their bosses it's where their capital investment dollars are going to go. And often those high-powered bosses reply with an emphatic "Huh?"

In fact, client/server computing is simply the personal computer industry's version of distributed processing. A look beneath the client/server concept, which is hardly a new one, reveals revolutionary ideas that have already cast long shadows across the future of mainframes and minicomputers.

With all the curiosity and confusion about what client/server computing really means, and about how application servers fit into this scheme, we decided it was time for *PC Magazine* to examine this new generation of computing.

In so doing, we learned a lot about the potholes, side roads, and detours on the road to a truly PC-centric information network.

WHAT IS AN APP SERVER ANYWAY?

Because there's still a lot of disagreement concerning the definition of an application server, we'll hew a simple path in the descriptions and definitions that follow, even at the risk of oversimplification.

Traditionally, personal computer networks have consisted of clusters of desktop computers connected to one or more file servers that run Novell's NetWare, Banyan's VINES, Microsoft LAN Manager, or another popular network operating system (NOS).

Photography by David Campbell

On the other side of the equation, the PC workstations run standard, off-the-shelf DOS, Windows, and OS/2 applications. In some cases, the applications reside on the workstation; in others, they reside on the server and are downloaded on request.

Client PCs also turn to the file server for shared resources and services, such as access to individual users' private files, to common workgroup files stored on the server, and to network printers, data modems, fax modems, and other devices.

SPLITTING THE WORK

Rather than using essentially the same PC applications used on standalone PCs, the client/server arrangement requires entirely new applications designed to divide the workload between the server and client.

The larger part of the application resides and executes on the server; data files reside there as well. A second, smaller part of the application program resides on the connected PC and works with the server-supplied portion to divide and manage tasks.

IN THIS REVIEW

AST Manhattan SMP P/60 300
Compaq ProLiant 2000 5/66 M4200A 301
HP NetServer 5/60 LM 305
Unisys PW² Advantage Plus Model 5608 306
Wyse Series 7000i Model 760MP 308

For example, imagine using a client PC to retrieve and analyze the billing information in a server-based database on all your company's accounts in Madison, Wisconsin.

At your PC, you enter the data request; at the server, a database program examines the database and extracts the requested information. That data, and only that data, is sent to your PC, where the client-resident part of the program sorts and displays it.

That done, you begin to work with the information. You decide to look at only those accounts that are seriously delinquent—those with past-due balances older than 90 days and greater than $1,000. That manipulation is performed on the data set entirely at your PC. Then you call up the PC's mapping program to display the information visually based on the ZIP code, age, and size of all accounts that are delinquent.

A pattern of deadbeats on the periphery of Madison starts to emerge. You make another request of the server's database— all delinquencies within 100 miles of Madison—and discover that you have a whole cluster of previously unnoticed suburban bad accounts. Time to get the collections department to focus on that area.

Consider what happened during that imaginary network computing session.

HIGHLIGHTS

Application Servers

APPLICATION SERVERS are the limousines of the personal computer world. They need to shuttle data quickly, surely, and efficiently from one place to the next. Conceptually, the application server provides the bulk of the application code, as well as access to large databases; on the other end, the client provides a graphical user interface and supporting programs for manipulating data. Under this setup, the client machine doesn't have to be a powerhouse; even a notebook with an external network adapter will fill the bill.

APPLICATION-SERVER PRICES are astronomical when compared with the prices of desktop computer systems or even those of file servers. Typical application servers can carry a price of between $17,500 and $50,000. The high cost reflects the price of the technology needed to ensure long-term hardware reliability and to protect the integrity of all data.

ADDING AN EXTRA CPU can make all the difference in performance. Through symmetrical multiprocessing, an application server can expand its processing power to grow with the increasing computing needs of a business. The most common application-server configuration utilizes 2 to 4 processors, but some systems can gang up to 16 processors in the same box.

NETWORK OPERATING SYSTEMS such as SCO Unix are able to take advantage of multiple processors, but NetWare 3.*x*—the most commonly used file-server NOS—can't. Our ServerBench testing was designed to run under the SCO Unix operating system and therefore to show performance differences between single-processor and multiprocessor configurations.

THE COMPAQ PROLIANT 2000 5/66 M4200A, the newest in application-server design, shows that Compaq's product has come a long way in the last year: The ProLiant's attractive price, useful and user-friendly features, and impressive performance put it ahead of this roundup's multiprocessing pack.

HEWLETT-PACKARD'S HP NetServer 5/60 LM platform was far and away the best server of the group—under NetWare. The NetServer lagged, however, on our ServerBench tests, which we ran under the SCO Unix operating system.

DATA STORAGE ON THE GIGABYTE scale needs special consideration in terms of efficiency, data security, and cost. By striping data across many disks, RAID configurations allow an application server to perform at high speeds and to recover quickly from the loss of a hard disk.

ERROR-CORRECTION CODE (ECC) memory is the key to keeping an application server up and running in a world where single-bit and multibit errors occur. ECC memory is capable of detecting and fixing data errors on the fly.

You made very efficient use of three expensive office resources that always seem to be in short supply: server time, network time, and—most important—*your* time.

The key point here is that the information interchange could have concerned anything; it could have been a travel agent looking for the best and least expensive way to get a large tour group

File servers are hardly obsolete: Many LANs will continue to run on servers under a more traditional network architecture

from Point A to Point B, a factory foreman trying to get a handle on his company's inventory of artificial Christmas trees, or a series of large and complicated banking transactions. Note also that the the client machine in this process didn't need to be a very powerful PC. Indeed, you might well have been using a notebook PC, because the really heavy-duty computing was performed by the application server.

Assuming the application was well designed, the server sufficiently powerful, and the network well tuned, the process will have been quick, and entirely invisible to the user. You didn't know or care what was happening or where it was happening; you just wanted answers.

And you got them. It also didn't matter where the needed data was—across the hall, across the street, or across the country; the data could even have been scattered among many databases and many servers.

In a very large nutshell, that's the essence of client/server computing. File servers are still useful and hardly are obsolete: Many LANs will continue to run on servers under a more traditional network architecture. And indeed, in some models of client/server computing, file servers are still used to provide some file services for application servers. But the real future of increasingly PC-centric business computing lies in the client/server model.

EDITORS' CHOICE

• Compaq ProLiant 2000 5/66 M4200A

Application servers carry such a tremendous burden in today's PC-centric network that they must be both the shiny, speedy sports car and the grubby, workhorse delivery van of a business's information infrastructure. Fast and nimble, an application server must carry a variety of loads to a range of destinations with absolute fidelity.

Even the most minor mistake could temporarily put a company out of business. The often-competing demands result in the application server's place at the pinnacle of the PC pecking order—often with a price tag more in line with a Ferrari or a Rolls-Royce than a Ford or a Plymouth.

BEST ALL-AROUND SERVER

The Compaq ProLiant 2000 5/66 M4200A, powered by a pair of 66-MHz Pentium processors, has the newest design of these high-end servers, and it fulfills the cost side of the network downsizing equation. While three of the other systems in this roundup cost less than the ProLiant, the unit still achieved the best price/performance score.

The ProLiant provides exceptional design with a 128-bit data path between processor and system memory, high-powered NetFlex-2 network interface cards, and a fast and responsive SCSI-2 disk controller.

But Compaq goes a step further by providing the user—usually the network administrator—with an excellent set of network-management tools. It provides SmartStart, a CD-ROM and floppy disk set that contains coded versions of the most popular network operating systems, and all the needed drivers—from NetWare to Unix to Microsoft Windows NT Advanced Server.

All the user needs to do is pay for the password and then load the operating system automatically onto the server's hard disk; thus the user can easily set a standard configuration for many servers. In addition, the Insight Manager utility monitors network operations and predicts future failures, thus minimizing network disruption.

In terms of performance, the ProLiant pulled away from the pack and never looked back. With a pair of 66-MHz Pentium processors, this unit is truly a high-end server, having led the way in most of this issue's performance categories—sometimes by as much as 30 percent.

If that isn't enough for your company's long-term computing plans, you can add another pair of processors when the need arises.

Even though the Compaq server stood out in this evaluation of five of the most powerful PCs we've ever tested, the other machines each had their own bright spots:

- With a wide and spacious case that can accommodate up to five Pentium processors and up to 16 disk drives, the AST Manhattan SMP P/60 is the application server of choice for the rapidly growing business.
- The HP NetServer 5/60 LM excelled in NetWare operations.
- A solid performer at small client loads, the Unisys PW² Advantage Plus Model 5608 is a very affordable Pentium-based system.
- The performance of the Wyse Series 7000i Model 760MP illustrates that an application server based on 486-class main processors can still offer a lot of power for the money.

The Gateway 2000 P5-Systems . . .

Wynot, Nebraska, is located approximately 60 miles from our headquarters in North Sioux City, South Dakota.
In the Midwest, we pride ourselves on good old-fashioned values and hospitality.

P5-60

- Intel® 60MHz **Pentium**™ Processor
- 8MB RAM, 256KB Cache
- 424MB 13ms IDE Hard Drive
- PCI Local Bus Graphics with 2MB
- PCI Fast IDE Interface
- 3.5" Diskette Drive
- 14" Color CrystalScan® 1024NI
- Baby AT Case
- 4 ISA, 2 PCI & 1 PCI/ISA Slots
- AnyKey® Keyboard & MS Mouse
- MS-DOS® 6.2 & WFW™ 3.11
- MS Works for Windows™

$2495

P5-60 Best Buy

- Intel 60MHz **Pentium** Processor
- 8MB RAM, 256KB Cache
- 424MB 13ms IDE Hard Drive
- PCI Local Bus Graphics with 2MB
- Double-Speed CD-ROM
- PCI Fast IDE Interface
- 3.5" Diskette Drive
- 15" Color CrystalScan 1572FS
- Baby AT Case
- 4 ISA, 2 PCI & 1 PCI/ISA Slots
- AnyKey Keyboard & MS Mouse
- MS-DOS 6.2 & WFW 3.11
- Choice of Application Software

$2795

P5-60

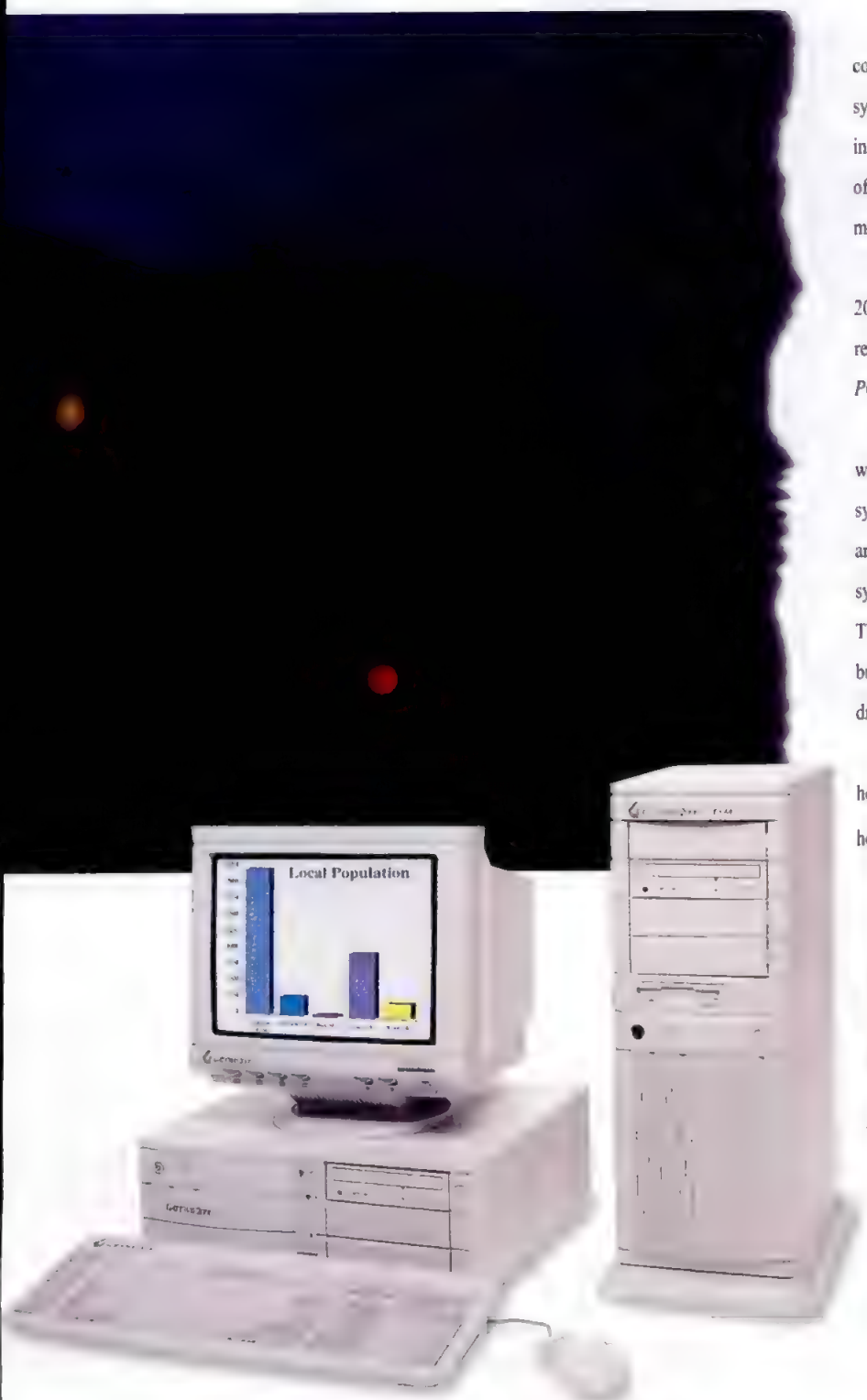
- Intel 60MHz **Pentium** Processor
- 16MB RAM, 256KB Cache
- 540MB 13ms IDE Hard Drive
- PCI Local Bus Graphics with 2MB
- Double-Speed CD-ROM
- PCI Fast IDE Interface
- 3.5" Diskette Drive
- 15" Color CrystalScan 1572FS
- Baby AT Case
- 4 ISA, 2 PCI & 1 PCI/ISA Slots
- AnyKey Keyboard & MS Mouse
- MS-DOS 6.2 & WFW 3.11
- Choice of Application Software

$3295

P5-66

- Intel 66MHz **Pentium** Processor
- 16MB RAM, 256KB Cache
- 540MB 13ms IDE Hard Drive
- PCI Local Bus Graphics with 2MB
- Double-Speed CD-ROM
- PCI Fast IDE Interface
- 16-Bit Sound Card & Speakers
- 3.5" Diskette Drive
- 17" Color CrystalScan 1776LE
- Tower Case, 300W Power Supply
- 4 ISA, 2 PCI & 1 PCI/ISA Slots
- AnyKey Keyboard & MS Mouse
- MS-DOS 6.2 & WFW 3.11
- Choice of Application Software

$3995



"Wynot" get the latest-technology Pentium-based computer systems at 486 prices? With a Gateway 2000 P5 system you can have one of the highest-performance systems in the industry at a phenomenal value. In fact, we're now offering four Pentium-based systems including a new 66MHz model, priced from $2,495 to $3,995.

You get all this plus award-winning service from Gateway 2000 — we captured the highest rating for service and reliability for both portables and desktops in the January 1994 *PC Magazine* Readers' Choice Awards.

Our P5 systems feature Intel's 64-bit Pentium processor, which moves instructions and data twice as fast as a 486 system. The Pentium processor has 16KB of internal cache, and the motherboard has 256KB of cache. Plus, the P5 systems get a big performance boost from a PCI local bus. The PCI bus can operate 10% to 15% faster than a VESA local bus, and the PCI IDE interface dramatically improves hard drive performance (up to twice as fast).

So why not buy a P5 system from Gateway 2000? It's the hottest PC in the industry from a company that believes in honest Midwestern values. *Call us today!*

PC Computing MVP 93 WINNER

SERVICE • RELIABILITY • PC MAGAZINE READERS' CHOICE

GATEWAY2000

You've got a friend in the business

800-846-2063

610 Gateway Drive • N. Sioux City, SD 57049-2000
Phone 605-232-2000 • Fax 605-232-2023

© 1994 Gateway 2000, Inc. AnyKey, CrystalScan, "G" logo and "You've got a friend in the business" slogan are registered trademarks, and Gateway 2000 is a trademark of Gateway 2000, Inc. The Intel Inside Logo, Intel and Pentium are trademarks or registered trademarks of Intel Corporation. All other brands and product names are trademarks or registered trademarks of their respective companies. Prices and configurations are subject to change without notice. Prices do not include shipping.

PathWay Management Station

- SNMPv2
- Graphical MIB compiler
- Graphical application builder
- Distributed device discovery
- Automatic map drawing
- Rule-based Expert System
- Alarm correlation and filtering
- Alarm acknowledgement
- SunOS, Solaris
- UNIXware, Motorola MPC
- Oracle/Ingres database support

With PathWay Management Station on your network, you gain the same advantages as the many Fortune 1000 companies who chose it too. Our exclusive Distributed Network Management Architecture offers a full-featured system with superior SNMP customization. Flexible, powerful, and easy to use, Management Station brings the benefits of standards-based open systems network management to the TCP/IP environment, giving you complete control of your network. No one else can deliver the strengths of Wollongong's distributed network management architecture, so call today for a free 30 day evaluation and learn the secret to success in network management.

WOLLONGONG

STRAIGHT TALK. SOLID SOLUTIONS.

1 ▲ 8 0 0 ▲ 8 7 2 ▲ 8 6 4 9

In California: 1-800-962-8649 or 415-962-7202 FAX: 415-962-0286 sales@twg.com. In Canada: 519-747-9900 In Europe: +31-(0) 2503-24142

©1993 The Wollongong Group, Inc. All rights reserved. All trademarks are property of their respective holders.

CIRCLE 103 ON READER SERVICE CARD

IN THIS REVIEW

When we asked PC makers for application servers, our sample configuration was more complicated than that requested in any previous review story. We asked for machines that are, first and foremost, multiprocessor platforms.

If a manufacturer wasn't currently shipping its application servers in a multiple-processor configuration, we looked into the vendor's commitment to producing multiprocessor platforms in the future.

The minimum system memory and disk storage were set at 128MB and 4GB (yes, gigabytes), respectively, with the storage configured either as a mirrored SLED (Single Large Expensive Disk) or as a RAID (Redundant Array of Inexpensive Disks).

If the server manufacturers did not supply their own Ethernet network interface cards (NICs), we installed four Eagle Technology NE3200s. Because of the complexity of today's network operating systems, a CD-ROM drive was requested to allow for the quick loading of software.

One consequence of these high-flying requirements is that the prices of our five machines push into the stratosphere, in the way of PCs: from $17,745 to $48,000. Keep in mind, however, that these application servers are effectively competing against minicomputers and mainframe setups that easily cost 10 to 20 times as much.

The reviews and analyses in the coming pages look at Pentium-based machines from AST Research, Compaq Computer Corp., Hewlett-Packard Co., and Unisys Corp., and at a 486DX2/66-based system from Wyse Technology. There were several no-shows: Acer America Corp., IBM, NCR Corp., and Sequent Computer Systems declined to participate. NEC Technologies was unable to deliver a working system by our deadline.

MORE. . .BIGGER. . . FASTER

The hardware resources required to meet the demands placed upon application servers are considerable. On one level, it's the old more/bigger/ faster measure—you want more RAM, bigger and faster hard disks, and so forth, in an application server. But look a little deeper and you'll see the need for more robust and advanced technologies—ones that are not yet offered by standard PCs.

Most important among those new technologies are drive arrays, error-correction code (ECC) memory, and multiprocessing. Drive arrays, or RAID configurations, are clusters of two or more hard disks that are run from a single controller. As we'll soon see, the acronyms RAID and SLED are somewhat deceptive.

RAID configurations offer faster performance and greater data security. Speed can be improved by simultaneously writing or reading different parts of a file to or from several disks—a process called *data striping*. This data striping technology is extremely complicated and is managed by a new generation of multidisk controllers.

If the speed advantages of simultaneous writes to several disks are obvious, the data-security advantages are less so—at first glance; in actuality, these advantages are truly profound.

In the simplest RAID configuration, which is called RAID 1, one disk can be used to make a ready-to-use mirror image of the primary hard disk. This setup obviously does nothing in the way of speed but a great deal in the way of data security, since the backup hard disk can be instantly moved on-line in the event of the primary hard disk's failure.

Other levels of RAID employ various data striping and/or error-checking-and-correction techniques, although the RAID levels are not arranged hierarchically. RAID 5, another popular disk array configuration, combines speed with security by placing error-detecting code and redundant information across several disks.

When a hard disk on a data-striped system goes down, the network administrator can immediately pull it out and insert a new, spare hard disk in its place; the RAID immediately begins restoring the data from the missing hard disk onto the new one. During this restoration of data, system performance is slowed, but the server—and the entire network—remains operational.

The process takes anywhere from a few minutes to half an hour, even when restoring data to very large disks, but this is a far cry from the hours required to restore a gigabyte of data across a network from, say, a DAT drive.

RUNNING THE NUMBERS

At the other extreme, the SLED approach is fading fast. Although offering some benefits, a SLED-based storage system generally gives neither the performance boost nor the enhanced data security possible with RAID configurations. And when you're depending on just a SLED, instead of on a RAID setup, you're out of business when the single disk goes.

While the names use the words *inex-*

RECENT REVIEWS

▶ **Pentium: The Second Wave**
January 25, 1994 .....*page 110*

11 Pentium PCs go head-to-head, breaking *PC Magazine* benchmark-test highs as they compete for the number-one spot.

▶ **Color Goes Mainstream**
December 21, 1993.....*page 191*

PC Magazine looks at 33 of the newest affordable color notebooks that can open the world of color to you.

▶ **The 486 Buyers' Guide**
December 7, 1993.....*page 108*

We evaluate 89 PC product lines to bring you *PC Magazine*'s one-stop shopping guide for 486 PCs.

Our Contributors: JIM SEYMOUR is a contributing editor at *PC Magazine*. MICHAEL BLAKELEY is an associate project leader, MARK JONIKAS is a senior project leader, and TIM STEFANINI is a senior project leader at Ziff-Davis Labs. ERIC HALE is the ServerBench development leader at Ziff-Davis Benchmark Operations. NICK STAM is a technical director (hardware) and AMARENDRA SINGH is a technical analyst at PC Magazine Labs. TAMI PETERSON was the project leader, and BRIAN NADEL was the senior associate editor in charge of this story.

What can you do with a Versa? What do you have in mind?

You are an unfinished book.

Our new Versa notebook is flexible enough to help you with all the pages of your life. It's a canvas with a keyboard. A power tool with a trackball. It's perfect for sharing ideas with people right in front of you or, using its advanced communications capabilities, a continent away. The artistry of its new, brighter, active-matrix color screen could well inspire you to some artistry of your own. While its unique, color TouchPen™ capability invites precise annotating, or impassioned finger-painting.

(For up to 10 hours on a single charge.) Versa can be a notebook, a desktop, or a tablet. Above all, its modular design lets it expand for changing needs and new technologies. Because in technology as in life, there's a new page written every day.

A work in progress. A flexible enough to help you with all the pages of your life. It's a canvas with a keyboard. A power tool with a trackball. It's perfect for sharing ideas with people right in front of you or, using its advanced communications capabilities, a continent away. The artistry of its new, brighter, active-matrix color screen could well inspire you to some artistry of your own. While its unique, color TouchPen™ capability invites precise annotating, or impassioned finger-painting. (For up to 10 hours on a single charge.) Versa can be a notebook, a desktop, or a tablet. Above all, its modular design lets it expand for changing needs and new technologies. Because in technology as in life, there's a new page written every day.

growing stack of unbound pages; the story of all you are, and will be. There are pages devoted to the things you have to do: Edit your report. Work on your presentation. There are other pages full of the things you like to do: Music. Art. Travel. But most are full of ideas that you'd like to share with the world. That you've *got* to share with the world. You are an unfinished book. And the best part of the story is, you'll never be done.

NEC

*UltraLite Versa 25C. PC Magazine 1-11-94. **340MB hard drive, starting up to 680 MB using Microsoft DoubleSpace. Versa, TouchPen, VersaTrack, DoubleTime and FastFacts are trademarks and UltraCare a service mark of NEC Technologies, Inc. Docking Station is a trademark of NEC Home Electronics, Inc. The Intel inside logo is a registered trademark of Intel Corp. All other trademarks and registered trademarks are the property of their respective owners. Specifications subject to change without notice. © 1994 NEC Technologies, Inc. NEC 0SAAP03006B140B0341

Our philosophy is that a notebook PC shouldn't be some frozen, soldered-together lump of metal and plastic, easily superseded by the next advance in technology. It should be upgradable and expandable, ready to embrace new technologies that come along.

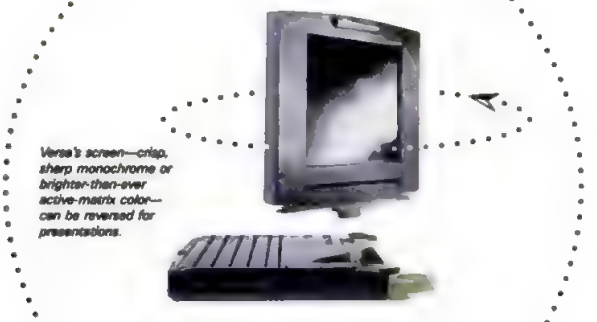
That's why we've made the NEC Versa arguably the most modular and expandable notebook PC you can buy.

It's also why, when you buy a Versa, you're buying into something else: a relationship. With us. We'll make it a relationship that works, too. By making component upgrades as easy as possible. And by being here to provide answers, support and a 3-year limited warranty enhanced by UltraCare,™ our full-service program of fast response and support anytime, anywhere, at home or overseas.

Starting out, of course, we've made Versa as powerful and as useful as technology permits. In fact, our new Versa is even more capable than the Versa that PC Magazine called "Best of 1993."*

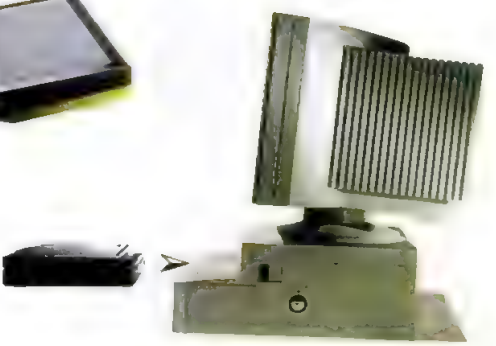
It uses the new SL-Enhanced 486DX2 40 or 50MHz processor, giving you both efficient power management and uncompromised processor performance. And it combines our latest local bus video technology with a powerful graphics accelerator, for amazingly quick graphics response.

It also has a nimble, integrated VersaTrack™ trackball, designed to work with the human hand, not against it. A hard drive that lets you store up to 680MB.** PCMCIA slots for instant upgrades in storage, wireless communications, networking and other future technologies. And more. (But that's all we have room for on this page.)



Versa's screen—crisp, sharp monochrome or brighter-than-ever active-matrix color—can be reversed for presentations.

Our exclusive DoubleTime™ technology lets you snap in a second battery in place of the removable floppy drive, giving you up to 10 hours of computing time



Versa's optional Docking Station™ or port replicator gives you desktop connectivity and capabilities, in seconds.

Versa converts quickly to a TouchPen-capable machine, sensitive to pen or even your fingertip, for editing, note-taking or just state-of-the-art doodling.

Call us at 1-800-NEC-VERSA. Or, for immediate response via FastFacts,™ call 1-800-366-0476, #83772.

CIRCLE 239 ON READER SERVICE CARD

NEC

pensive and *expensive,* don't be fooled. SLED systems are not particularly expensive: You'd pay as little as $1.50 to $2 per megabyte of storage. By the same token, the hard disks in RAID systems aren't particularly inexpensive. They are typically large, state-of-the-art disks that use SCSI-2 architecture; and with the added cost of the special disk controller required for RAID configurations, typical storage will cost you $3 to $4 per megabyte.

But in the RAID world of disk storage, 1 times 4 does not equal 4. Take, for example, a disk system composed of four 1GB drives in a typical RAID 5 array. The system does not in fact deliver 4GB of storage, because some space must be devoted to the parity-checking and sector-redundancy schemes that make RAID systems so secure.

In a RAID 1 setup, a pair of mirrored disks would double the per-megabyte storage costs because the second disk is used only for backup. A typical four-disk RAID 5 setup, on the other hand, would add approximately a 25 percent price premium for this belt-and-suspenders overhead.

BIT-FIXING

The second new-to-PCs technology essential to application servers is ECC memory. The far more primitive parity-checking scheme universally used in IBM compatibles merely shuts the system down—hardly the approach for a server that contains a company's records and is its most powerful tool. The goal in the client/server world is not only to detect errors but to fix them on the fly as well.

We haven't seen ECC on PCs before, because the extra circuitry in the memory controller costs more, and because the ECC process adds processing overhead that can slow memory down slightly. ECC works by adding extra check bits to data held in RAM.

These check bits allow code in the memory controller to test for, detect, and fix single-bit errors in the datastream, and to detect all double-bit and most multiple-bit errors as well. Single-bit errors are by far the most common and, in the volumes of data involved in application-server usage, occur more frequently than one might expect.

The overhead of the extra bits needed to use ECC requires at least 32-bit memory words. For true efficiency, this really demands 64-bit words, which, not so coincidentally, are what the Pentium processor uses.

For example, in a typical ECC setup, you would need 5 additional ECC bits to take care of error-correcting memory functions if your computer system used 16-bit words, as is the case with 286-based PCs.

If your system used 32-bit words, however—as is the case in 486-based PCs—or 64-bit words—as with Pentium PCs—your system would need only 6 or 7 ECC bits, respectively. Thus, the number of ECC bits needed for error-correcting efficiency gets proportionately smaller as the word size increases.

This fact makes ECC memory a good bet in Pentium-class machines as well as in machines using other 64-bit RISC processors. In the older world of discrete DRAM memory chips and small SIMMs, ECC would have added a prohibitive cost penalty, but with the 16MB and higher-capacity SIMMs used in these machines, the penalty is very small. In any case, as with RAID, the role of application servers tends to be so important that small cost differences are insignificant.

The AST Manhattan SMP P/60, Compaq ProLiant 2000 5/66 M4200A, and Wyse Series 7000i Model 760MP machines use ECC memory, a definite advantage when downtime is measured not in minutes and seconds but in dollars and cents. HP said it planned to offer ECC memory in early 1994.

ONE PLUS ONE EQUALS?

An application server is subject to greater demands for computing horsepower than desktop PCs or file servers are. It requires not only a fast and powerful main processor chip; this type of machine often requires more than one of them.

The issue of scalability is important because application servers are major investments, and their firepower should be scalable to the task at hand, both at the time of initial installation and later, as demands on the system are likely to increase. Network managers should be able to increase not only the size and number of hard disks and the amount of RAM installed but also the number of processors in the server.

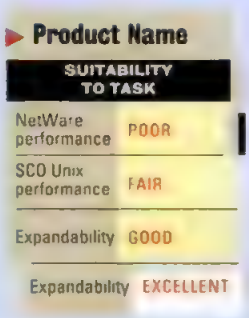
Managing multiple processors is a far more complicated task than driving just one, and it requires a more sophisticated operating system. NetWare 3.*x*, the most widely used file-server network operating system, does not support multiple processors, but Microsoft's new Windows NT

Suitability to Task: Application Servers

The **NetWare performance** Suitability to Task score is based on an application server's performance on the Ritesize test. Although the Ritesize test can be run on different databases and in different operating environments, for this issue's testing, it was run with the Sybase SQL Server, Version 4.2, under NetWare 3.11.

Whereas the network interface cards had a minimal impact on most of our ServerBench test scores, these cards had no impact whatsoever on the servers' Ritesize test scores. The Ritesize test measures only each server's database functionality in a client/server network environment. And unlike ServerBench, which is a simulated client/server test suite, the Ritesize test uses a real database to carry out its tasks

The **SCO Unix performance** Suitability to Task score indicates an application server's relative performance in the SCO Unix operating environment, as tested with ServerBench. Because SCO Unix is an operating environment that supports multiple-processor systems, those servers that came to us for testing with two processors received scores that reflect their scalability from one to two processors. Three of the five application servers tested, the AST Manhattan SMP P/60, the Compaq ProLiant 2000 5/66 M4200A, and the Wyse Series 7000i Model 760MP, came with two processors.



The **expandability** score reflects an application server's expansion potential. Among the included factors in this rating are the maximum number of slots and bays, processor capacity, maximum hard disk capacity, and number of RAID levels supported. RAM and cache limits are factored in as well

Price/Performance Index: *Application Servers*

The five application servers in this review offer a wide variety of options and performance levels, but their price span is equally large.

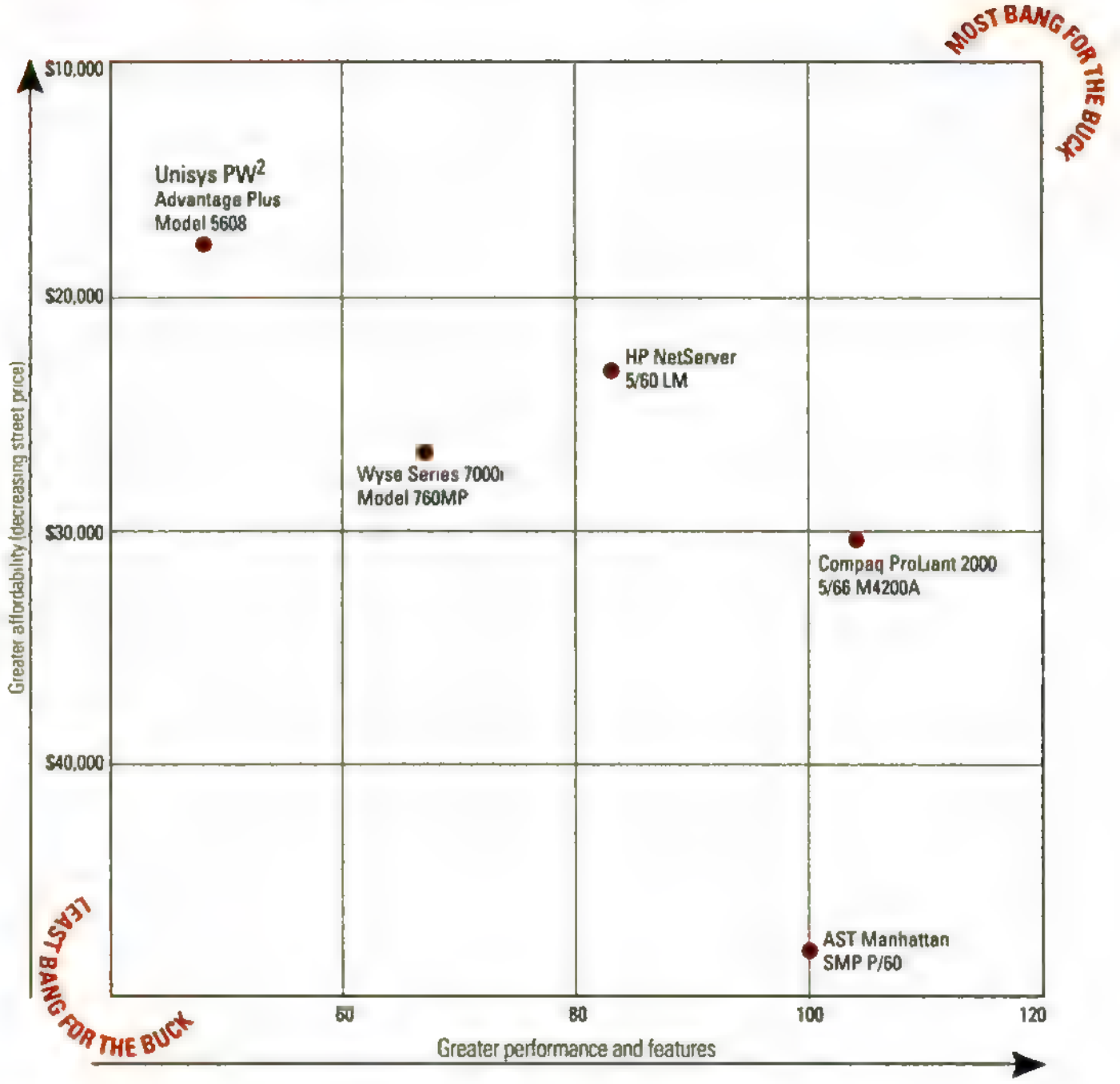
The AST Manhattan SMP P/60 and the Compaq ProLiant 2000 5/66 M4200A led the pack in terms of performance. Price, however, is what sets those two servers apart. The Manhattan's price is staggering—almost $18,000 higher than the ProLiant's. The ProLiant's price/performance rating shows the best bang for the buck.

While the HP NetServer 5/60 LM's performance lagged behind that of the ProLiant, its price may make it a good choice for the budget-minded user.

The Wyse Series 7000i Model 760MP falls in the middle of our price/performance chart. While its two Intel 486DX2/66 main processors couldn't quite keep up with the two-processor Pentium systems (the Manhattan, NetServer, and ProLiant), the system's upgradability and middle-of-the-pack price tag help make it an attractive prospect in spite of its average performance.

The Unisys PW² Advantage Plus Model 5608 set the price floor for this group of application servers. Unfortunately, it also checked in with the lowest performance score, which lends credence to an old adage: You get what you pay for.

Note that none of the tested application servers fell into the lowest quarter of the chart, where poor performance is accompanied by a high price.



THE DATA POINTS

In calculating each system's price/performance index, we based about 85 percent of the score on the system's Ritesize and ServerBench benchmark test results. The remaining 15 percent took into account the maximum RAM, the hard disk capacity, the number and type of processors supported, the total number of expansion slots and drive bays, the number of power-supply connectors, and RAID support.

Prices in this chart are based on the tested configuration for each system (as listed in the system's fact file).

Advanced Server, Banyan's VINES, and SCO Unix all support symmetrical multiprocessing (SMP). We chose SCO Unix for our tests because it was the most widely available SMP NOS.

While operations per second and pixels per second are indicators of desktop performance, in the network world, transactions per second (tps) define how a server is quantitatively evaluated. Transactions per second is a measure of the number of requests the server can complete in a second.

With a single processor, Hewlett-Packard's HP NetServer 5/60 LM pulled away from the pack under the NetWare-based Ritesize benchmark test; this unit completed almost 60 tps at a full client load of 60.

But performance increases dramatically when a server can take advantage of a second processor. Based on testing and analysis performed by Intel, adding that second processor (and at times a third, fourth, and fifth one) can boost processing power by between 77 and 100 percent for each additional processor.

Our ServerBench test suite confirmed the value of multiple processors in application servers running under SCO Unix. Three of the five reviewed machines arrived with multiple processors. Even the slowest of them, the twin-486DX2/66-based Wyse 7000i, outperformed the 60-MHz and 66-MHz Pentium-based systems in their single-processor configurations.

In its dual-processor configuration, the Compaq ProLiant was the clear winner in the overall ServerBench category, outperforming the AST Manhattan by about 20 percent. That advantage held under disk, network, and processor subsystem testing. Based on a pair of 486 chips, the Wyse 7000i found a comfortable place between the single- and dual-processor Pentium systems. Paradoxically, the Compaq ProLiant came in with the lowest up-front costs: under $1,000 per tps of operation, as compared with more than $2,000 for other servers.

But be warned: As you add processors, the idiosyncrasies of SCO Unix become evident. For example, much of the two-processor machines' edge in the numbers can be attributed to SCO Unix's default caches.

At installation, SCO Unix creates a

Remember how simple life used to be?

It still is.

At AT&T/NCR.

When you were young, your world was your own. And nobody was more important than *your best friend.*

Today, your world's a little larger. But, admit it, with the complexities of everyday life, don't you yearn for the *simple, honest, direct friendships you had as a kid?*

We make buying a computer what it should be: easy... simple... direct.

At AT&T/NCR, we want your relationship with us (and your computer) to be *uncomplicated and rewarding.* Our only goal is to delight you with the ease and simplicity of owning and using one of our computers. And the best way to do that, of course, is to give you the very best technology supported by a *team of friendly, knowledgeable people.*

One call starts it all.

It begins with the skilled associate at the other end of this 800 number_someone who helps you select the system that's right for you. You can *choose from the latest, proven technology* designed to run your applications to the fullest.

It's the little things that count.

We don't expect you to know all the details that separate an ordinary PC from the quality we build into ours. That's our job. But here are a few you might appreciate: ***performance-matched components*** for an extra measure of durability; ***parity RAM*** for internal error checking; ***write-back cache*** for faster applications; ***ZIF sockets*** for easy upgrading; and an ***open system architecture*** that lets you plan for the future. If you want to know more, just call us.

Questions? A Techline associate wants to talk to you...

When your computer arrives, it'll be up and running in a few short steps. If you have any questions, no matter how simple or complex, just pick up the phone and talk with one of our Techline associates. They're ready to *lend you a helping hand* anytime day or night.

Financing is easy, too. Use a major credit card. Or consider a lease through AT&T Capital Corporation. Don't forget, you have ***30 days to try out your new system.*** If for any reason you find it's not right, we'll get another for you, or refund your money. It's that simple.

A friend in need...

Once you're up and running, we stick by you with an industry-leading service and support program. It's highlighted by our ***free on-site, three-year warranty*** (meaning we come to you) that *includes parts, labor and monitor.* (Frankly, we're pretty proud of this. Because we don't know anybody else who commits this strongly to their customers.)

...is a friend in deed.

And if you need on-site service, we're just an 800 number away. We'll send one of our ***5,000 AT&T/NCR-trained Service Technicians*** to your business or home the next business day. They'll show up with the skills, parts and dedication to get your PC back on its feet in no time. (With over 700 locations in the U.S., *we're always close at hand.*)

Call AT&T/NCR. And see how simple life can be.

A computer built and backed by people committed to delighting you. That's the kind of relationship you'll have with AT&T/NCR. Promise. All you have to do is call NCR Direct Connect, or a reseller nearest you. It's that easy. That simple. After all, what are friends for?

We make PCs easy.

$1,290
or $47/month

Intel Pentium OverDrive Ready
Intel486SX/25 (upgradable to 50 MHz)
3 ISA Expansion Slots/3 Drive Bays
120MB Hard Drive (expandable to 1GB)
4MB RAM at 70ns (expandable to 32MB)
External Cache Upgradable to 256KB
3.5" Floppy Disk Drive
VESA Local Bus Video
Windows TurboCharger Video w/1MB Video RAM
14" SVGA VESA Flicker-Free .39mm Monitor

Simply Outstanding!

All NCR Desktop Systems Include:

Microsoft Mouse · Windows · MS DOS
Options: CD-ROMs, Fax/modems, Networking cards, Memory/disk upgrades, Printers, A variety of popular applications.

Get the latest releases of Microsoft® software:

Office 4.0 only $429
Word 6.0, Excel 5.0, Power Point 4.0 only $249 ea.
Works 3.0 $99

AT&T | NCR An AT&T Company

intel inside

Call NCR Direct Connect: 1-800-627-8313

NCR products are available through Direct Connect or call 1-800-624-7187 for the reseller nearest you.

Some of life's simple pleasures.

System 3230
Performance On A Budget!

$1,415 or $52/month

- ***Intel Pentium OverDrive Ready***
- Intel486SX/25 (upgradable to 50 MHz)
- 3 ISA Expansion Slots/3 Drive Bays
- 160MB Hard Drive (expandable to 1GB)
- 4MB RAM at 70ns (expandable to 32MB)
- External Cache Upgradable to 256KB
- 3.5" Floppy Disk Drive
- VESA Local Bus Video
- Windows TurboCharger Video w/1MB Video RAM
- 14" SVGA VESA Flicker-Free .28mm Monitor

$1,510 or $55/month

- ***Intel Pentium OverDrive Ready***
- Intel486SX/33 (upgradable to 66MHz)
- 3 ISA Expansion Slots/3 Drive Bays
- 160MB Hard Drive (expandable to 1GB)
- 4MB RAM at 70ns (expandable to 32MB)
- External Cache Upgradable to 256KB
- 3.5" Floppy Disk Drive
- VESA Local Bus Video
- Windows TurboCharger Video w/1MB Video RAM
- 14" SVGA VESA Flicker-Free .28mm Monitor

$1,810 or $66/month

- ***Intel Pentium OverDrive Ready***
- Intel486DX/33 (upgradable to 66MHz)
- 3 ISA Expansion Slots/3 Drive Bays
- 240MB Hard Drive (expandable to 1GB)
- 4MB RAM at 70ns (expandable to 32MB)
- External Cache Upgradable to 256KB
- 3.5" Floppy Disk Drive
- VESA Local Bus Video
- Windows TurboCharger Video w/1MB Video RAM
- 14" SVGA VESA Flicker-Free .28mm Monitor

System 3227
Green Power In A Small Footprint!

$1,830 or $67/month

- ***Intel Pentium OverDrive Ready***
- Intel486SX/33 (upgradable to 66MHz)
- 1 ISA Expansion Slot/2 Drive Bays
- 240MB Hard Drive (expandable to 520MB)
- 8MB RAM at 70ns (expandable to 32MB)
- 3.5" Floppy Disk Drive
- VESA Local Bus Video
- Windows TurboCharger Video w/1MB Video RAM
- 14" ESVGA Power Management .28mm Monitor

System 3231
Green For Home Or Office!

$1,975 or $72/month

- ***Intel Pentium OverDrive Ready***
- Intel486DX/33 (upgradable to 66MHz with System Management Mode
- 3 ISA Expansion Slots/3 Drive Bays
- 270MB Hard Drive (expandable to 520MB)
- 8MB RAM at 70ns (expandable to 48MB)
- External Cache Upgradable to 128KB
- 3.5" Floppy Disk Drive
- VESA Local Bus Video
- Windows TurboCharger Video w/512KB Video RAM (upgradable to 2 MB)
- 14" ESVGA Power Management .28mm Monito

System 3333
Fantastic Powerhouse!

$2,320 or $85/month

- ***Intel Pentium OverDrive Ready***
- Intel486DX2/50
- 2 VESA Expansion Slots/4 Expansion Slots
- 5 Drive Bays
- 240MB Hard Drive (expandable to 2GB)
- 8MB RAM at 70ns (expandable to 64MB)
- External Cache Upgradable to 256KB
- 3.5" Floppy Disk Drive
- VESA Local Bus Video
- Windows TurboCharger Video w/1MB Video RAM (upgradable to 2MB)
- 14" SVGA VESA Flicker-Free .28mm Monitor

$3,405 or $124/month

- ***Intel Pentium OverDrive Ready***
- Intel486DX2/66
- 2 VESA Expansion Slots/4 ISAExpansion Slots
- 5 Drive Bays
- 520MB Hard Drive (expandable to 2GB)
- 16MB RAM at 70ns (expandable to 64MB)
- 256KB External Cache
- 3.5" Floppy Disk Drive
- Upgradable to VESA Local Bus Video
- SVGA Server Video w/512KB Video RAM (upgradable to 2MB)
- 14" SVGA VESA Flicker-Free .39mm Monitor

$3,600 or $132/month

- ***Intel Pentium OverDrive Ready***
- Intel486DX2/66
- 2 VESA Expansion Slots/4 ISA Expansion Slots
- 5 Drive Bays
- 340MB Hard Drive (expandable to 2GB)
- 12MB RAM at 70ns (expandable to 64MB)
- 64KB External Cache (upgradable to 256KB)
- 3.5" Floppy Disk Drive
- VESA Local Bus Video
- Diamond Viper Video (Weitek P9000) w/2MB Video RAM
- NEC 15" SVGA VESA Flat Screen .28mm Moni

Safari 3150
Road Ready!

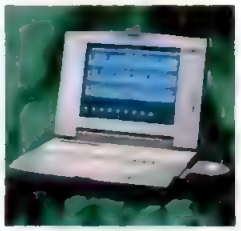
Includes Free 14" Color ESVGA Monitor and External Keyboard! (with 120MB HD Mono Model only)

$1,995 or $73/month (Mono)

$2,995 or $110/month (Passive Color)

- Intel486SX/25 (upgradable to i487)
- 120MB Removable Hard Drive (80MB & 170MB available)
- 3.5" Internal Floppy Drive
- 9.5" Monochrome Screen (DS passive color and active color also available)
- 4MB RAM (upgradable to 20MB)
- 1 PCMCIA Slot (Type 2)
- Local Bus Video w/Dual Video Display
- Front-Mounting Cableless Trackball
- Enhanced Pre-loaded Software. DOS, Windows, Bitfax, Tourguide, AT&T Mail AccessPlus and on-line documentation

PCComputing USABILITY APPROVED



Safari 3180
Fully Loaded For On The Go!

$4,230 or $154/month (Active Color)

$2,825 or $103/month (Mono)

- Intel486SL/33
- 180MB Removable Hard Drive (250MB availabl
- 3.5" Removeable Internal Floppy Drive
- 9.5" TFT Active Color Removable Screen (9.4" monochrome also available)
- 4MB RAM (upgradable to 12MB)
- 2 PCMCIA Slots (Type 2) or 1 Slot (Type 3)
- Local Bus Video w/Dual Video Display
- Trackball
- Enhanced Pre-loaded Software· DOS, Windows, Bitfax, Tourguide, AT&T Mail AccessPlus and on-line documentation

Demand the best. Only with AT&T/NCR.

Next business-day service and 24-hour technical support.
Free on-site 3-year warranty - parts, labor and monitor included.

We accept VISA, MasterCard or American Express credit cards. Ask about our business financing and leasing options through AT&T Capital Corporation. **Hours: 8-8, M-F; 10-6, Sat.**

Call NCR Direct Connect:

1-800-627-8313

Now serving Puerto Rico

AT&T | NCR An AT&T Company

NCR is the name and mark of NCR Corporation. AT&T and the AT&T globe design are registered service marks and trademarks of American Telephone and Telegraph Company. The Intel Inside logo, Intel486 and Pentium are trademarks of the Intel Corporation. DOS and Windo are trademarks of Microsoft Corporation. All other trademarks acknowledged. Prices, configuration and availability subject to change without notice. Prices and money-back guarantee do not include shipping. Shipping charges are calculated according to weight and distan Appropriate sales tax will be added. NCR Corporation is not responsible for errors in typography or photography. Product offering and prices may vary by dealer reseller. © 1994 NCR Corporation.

reasonable 6.5MB RAM cache when it detects a single processor, but it creates a whopping 64MB cache when it finds multiple processors. With a cache that large, the overwhelming majority of client requests are met from cached data rather than from the hard disk, which requires more time.

If using more than one processor is good, is using more than two even better? Compaq's ProLiant accepts four processors; the AST and Wyse units can handle five. We tested machines only in single- and dual-processor configurations. That was due partly to limitations in SCO Unix, under which using more processors sometimes results in decreased system performance as the burden of the NOS's overhead in parceling out work to those processors begins to cancel out the advantages of the extra processors.

Beyond that, companies such as NCR, Sequent, and Tricord Systems have put together SMP systems that incorporate many more processors and that rival mainframes in terms of cost and power.

BUS STOPS

Building the perfect server involves more than merely ganging as many processors as possible. The bus is frequently the bottleneck for the Pentium processor, which can transfer data at a maximum rate of 528 megabytes per second (four times the throughput of the 486 chip) when taking advantage of the Pentium's full address pipelining. By contrast, the 32-bit EISA bus can handle only 33 MBps.

To speed the data flow, most Pentium servers use a proprietary bus design. The most common solution is to widen the memory bus to 64 bits. One way to increase bus performance is shown by Compaq's elaborate TriFlex architecture, which can be found in its ProLiant server. The ProLiant uses a 128-bit memory bus and a 64-bit processor bus to boost throughput to 267 MBps.

Another approach, demonstrated by Hewlett-Packard's NetServer, is to push the 32-bit design to its fullest by reducing data-transfer delays. This server's XPress bus architecture consists of a self-synchronizing interface connecting the processor, memory, and EISA expansion bus.

The downside is that the system must wait several clock cycles to synchronize the buses, but this performance loss is easily made up, because once data transfers occur they are perfectly timed. The XPress system can also double-clutch: synchronizing at 33 MHz when an EISA device tries to access memory, or at 60 MHz when the main processor tries to access memory.

MANAGING THE SERVER

Beyond raw processing power, drive arrays, and huge memories, other factors come into play when choosing—and managing—the right application server for your network. Indeed, the manageability of these behemoths can become a major issue for those accustomed to the simpler world of file servers and NetWare.

Tools such as Compaq's SmartStart CD-based NOS-loading and -configuration utility are a good start. SmartStart allows the network administrator to set a base configuration and automatically load the NOS without dealing with a box full of floppy disks.

Server power is an issue, too. It's unthinkable to run a server these days without an uninterruptible power supply (UPS) attached. But buying a UPS doesn't solve all your potential power problems. What about the power supply that exists inside your server? If that goes out, it won't matter that the UPS connected to the server is still supplying nice, steady power: Your server, and that once-impregnable RAID, is already dead.

Redundant, auto-switching internal power supplies are important features in all servers, but only one machine that we tested—AST's Manhattan—had a second built-in power supply ready to take over if the primary power supply failed.

More worries about power: What if the internal power supply in a RAID array itself goes out? Once again, you're out of business, even if the system's power is still fine.

Rather than relying on the system power supply, or providing a single, separate RAID-only power supply shared among the disks, the best RAID configurations provide multiple power-supply units—in some cases, one unit for each disk in the array.

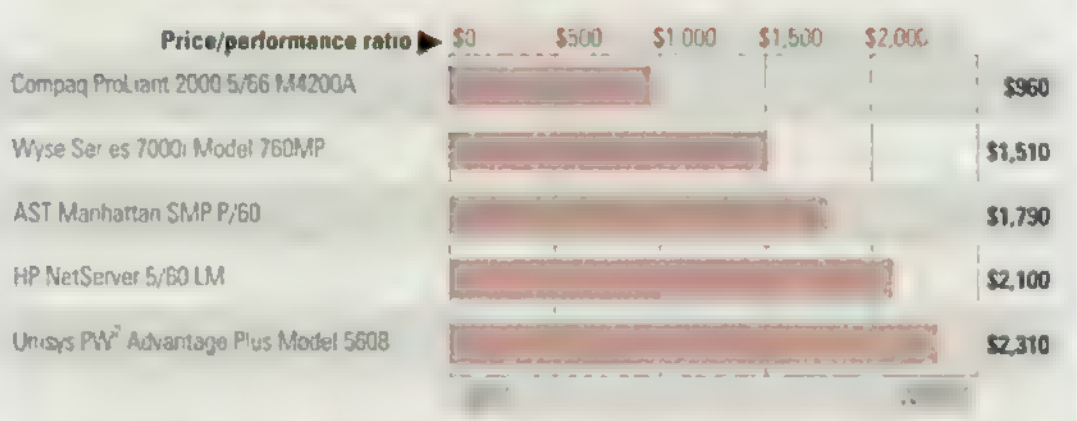
Finally, what will you do about backup? Once you're dealing with this many gigabytes of mass storage, you're into the realm of high-density backup systems and probably "near-off-line" storage. That means you'll need 8-mm or 4-mm DAT or another high-capacity tape system, perhaps even an automatic tape-changing carousel.

And it means using some form of Hierarchical Storage Management (HSM), which regularly grooms your primary (that is, disk array) storage for files that can be moved to on-line—but slower and cheaper—tape or optical disk drives. In buying a server, adding tape backup and HSM accounts for no more than a few well-spent pennies on the dollar and pays off with increased data security.

The world of client/server computing, and of these complicated, powerful application servers and their operating systems, is a big step up from buying, installing, and supporting the conventional file-server LAN.

Whether to buy an application server isn't a decision to be taken lightly. But then at these prices, no one—except the millionaires among us—is going to see an application server as an impulse purchase.

The Price of Performance



To determine each system's **price/performance ratio,** we divided the list price by the unit's overall ServerBench score (in transactions per second) when tested with a full client load. Thus, the ratio represents the cost per tps of processing power.

What the Numbers Mean

In creating a client/server environment, we used two indicators of server performance: ServerBench 1.0 measures a server's ability to perform transaction processing under SCO Unix, and Ritesize gauges performance under NetWare.

SERVERBENCH PERFORMANCE

ServerBench generates a server's client/server score by using a weighted harmonic mean of the individual subsystem test scores; we place the main emphasis on an application server's processor and disk subsystems. We place secondary weight on a server's network capabilities, because they are the least used during most client/server operations.

All five servers we reviewed are symmetrical multiprocessor (SMP)–compliant, and most of them are based on the Pentium chip. The AST Manhattan SMP P/60 carried two 60-MHz Pentium chips; the Compaq ProLiant 2000 5/66 M4200A had a pair of 66-MHz Pentium chips; the Wyse Series 7000i Model 760MP carried two 486DX2/66 CPUs; and the HP NetServer 5/60 LM and the Unisys PW^2 Advantage Plus Model 5608 each used a single 60-MHz Pentium. Whether configured with one or two processors, each server had a 256K cache for each processor installed, and each machine carried 128MB of RAM. Each server was quite capable of managing complex tasks in a large-workload client/server environment.

The Compaq unit, with its two Pentium/66 CPUs, was clearly the best of this roundup. It incorporates Compaq's proprietary TriFlex architecture, which features a wide 128-bit path between the CPU and memory. The four NetFlex-2 network cards Compaq provided outperformed the Eagle NE3200 cards, which were used in testing the other machines, by a wide margin.

The AST server nipped at the Compaq's heels on nearly every test, including the overall ServerBench client/server benchmark test.

In a single-Pentium configuration, the AST was 80 percent as fast as the single-Pentium Compaq, as was the HP. Behind it on this test were the Unisys and Wyse servers. The Wyse is based on the less powerful 486DX2/66 processor, and its performance lagged. The Unisys was the laggard of the Pentium bunch, probably because of its proprietary bus architecture, which provides only a 32-bit path between the CPU and memory (other systems provide 64-bit paths), and its single-spindle drive setup.

PROCESSOR AND MEMORY

The processor and memory subsystem test measures a server's ability to do work internally, without input/output operations. The test shows how well the CPU handles a multitude of requests—for instance, all common types of instructions, such as string manipulation, integer arithmetic, and memory copying.

The processor and memory subsystems of each server manipulate data records that contain realistic, sales-oriented fields (such as customer IDs, outstanding balances, and available credit) that combine for a total record size of 125 bytes. The entire data set is 2,800 records—a total of 350,000 bytes of data for each client.

The Compaq outperformed the other servers, hitting its peak in single-processing mode at about the same number of clients as did the other single-CPU, Pentium-based servers (from 20 to 24 nodes) but at a higher number of transactions per second throughout.

The same trend held true for the Compaq when we compared its dual-CPU performance with that of the two other dual-CPU servers. The Compaq and the AST peaked at 40 clients, but the Compaq maintained an average of 1.7 tps more than the AST at each load, and it usually outperformed the dual 486DX2/66-based Wyse by at least 4 tps. The Wyse's peak at 32 clients was lower than the peaks of the Compaq and AST, but its dual-CPU configuration may be more cost-efficient for some network environments, since it did outperform all of the single-Pentium servers.

While part of the Compaq's superior performance is certainly due to its dual 66-MHz Pentium processors, the system's supporting chip sets are the real key. The proprietary TriFlex bus architecture ensures top performance from the memory subsystem.

While most other servers use proprietary 64-bit bus architectures, the Compaq goes a step further. In addition to providing the standard 64-bit path between the processor's external (L2) cache, it has a unique 128-bit path to the fast paged/interleaved memory subsystem. When the wide bus is coupled with the interleaved accesses and page hits, the Compaq's memory subsystem shines.

HARD DISK SUBSYSTEM

There are five disk subsystem tests: sequential read, sequential write, random read, random write, and append tests. ServerBench creates a 1MB test file for each client before the server performs the actual tests. All the tests except the append test generate a random number to use as a starting point in each test file. ServerBench places the starting point so that reads do not go past the end of a file.

When SCO Unix is installed in a server, a disk software cache is set aside from available system memory. We used the SCO Unix default settings of 6.5MB for single-processor systems and 64MB for multiprocessor systems. As expected, the hard disk subsystems' performance in the three dual-proces-

CONTINUES

sor systems was dramatically better than in the single-processor systems—sometimes with more than ten times the throughput—because of the large difference in cache size.

Going from one to two CPUs presented a few erratic shifts for the Compaq server. With the client load increased from 16 to 20, it took a brisk downturn, going from a peak of about 71 tps to about 57 tps. Just as abruptly, the server bounced back, going to its initial peak rate and then remarkably increasing its net tps at increasingly high client loads.

Part of this irregularity is possibly due to the idiosyncrasies of SCO's algorithm, which allocates tasks across the dual processors. Remember that the Compaq's 66-MHz processor is the fastest of the Pentium line, meaning that this processor is perhaps the most difficult to manage during critical task switches. The AST server, with 60-MHz Pentiums, did not have the same erratic behavior. But it also did not demonstrate the accelerated performance of the Compaq when operating at its full processing capacity.

On these disk tests, the Compaq's consistently excellent performance at all client loads had little to do with its disk subsystem and a lot to do with its TriFlex architecture, which provides a 128-bit path to memory. In the case of the dual-processor servers, our test load of 60 clients never really stresses the servers' hard disks; each client works at a given time with files no larger than 1MB, for a total of 60MB potentially in use in a server at a given time. Consequently, the servers' processor and memory subsystems matter the most—that is, up to the point where disk operations are no longer contained solely in the cache, and the speed of the hard disk becomes the main performance bottleneck.

Compaq's NetFlex-2 network cards and drivers are speed demons compared with those used for the other servers. And since the disk tests perform their operations reading and writing from the server's own hard disks (as would occur in true client/server applications), a fast network interface gets those requests back in a hurry, merely returning small response packets across the network to the requesting client when finished. Judging by the escalated performance the Compaq enjoyed at its highest loads, we suspect its NetFlex-2 network interface cards contributed to its stellar finish.

The Wyse, in its dual-processor configuration, didn't falter whatsoever at any point in its ability to manage tasks as more were added. Instead, its performance leveled off at 12 clients and maintained roughly the same performance level as the AST until its final load of 60 clients.

For single-processor servers with the smaller 6.5MB disk caches, all systems performed about the same. As a group, the performance curve peaked at 4 to 8 clients—when the systems started using their hard disks instead of their caches to handle operations—and then held steady, with most of the servers at around 5 tps for the remainder of their loads. There was one exception, however: the HP server.

The HP had four 1GB Seagate 11200N/ND hard disks, as did the Unisys, but the Unisys server was only about half as fast on our disk tests. The HP had no RAID formatting utility for SCO Unix, so all of its disk tests were run on a single 1GB unit.

The AST and HP each used a Mylex DAC-960 disk controller with a 4MB hardware cache, but because the HP has a customized version, it outperformed the AST substantially. In fact, the AST performed about even with the Unisys.

After a close inspection of the individual disk tests, we found that the HP server did extremely well on its sequential reads and writes because it used a single-channel implementation of its proprietary Mylex controller and what the company calls "source synchronization" between the controller and RAM. With the controller essentially running in bus-master mode, sending bursts to the RAM subsystem, the RAM synchronizes to the EISA bus-master burst rate; no asynchronous transfers occur.

This also speeds up the random read/write activity, but by a slower margin. The context switching that occurs between channels on AST's retail version of the Mylex board may actually slow this server slightly, in comparison with the HP and its different implementation of the same controller.

NETWORK INTERFACE

There are two network subsystem tests: client-to-server and server-to-client. ServerBench works with networks at the OSI (Open Systems Interconnect) transport level and can get test results closer to what you see in a production system. All of our tests were run on an Ethernet network. These results are indicative of the results if the same tests were run on a Token-Ring network.

No matter the network architecture, you will learn as much about SCO Unix as you will about the reviewed servers by looking at their network-subsystem test results. At the single-processor level, the test results tell you each server's processor performance and the strength of the network interface, including card drivers.

The Wyse server used the same network interface—an Eagle NE3200—as the AST, HP, and Unisys but contains a slower processor. The latter three, all Pentium-based, performed about equally on the network tests, with the same performance curves. The Wyse tracked the other servers' performance curves, but at a lower tps rate.

The Compaq, on the other hand, is not marginally faster than the others just because of its processor. It handles about 33 percent more transactions per second than the next-fastest server because Compaq sent its own NetFlex-2 network interface cards. The server's fast memory subsystem also contributed to its network results, because data buffers are read from and written to the disk cache residing in system memory.

On the surface, we see that in terms of network operations, the two-proces-

sor Compaq was outperformed by the single-CPU Compaq by 15 percent. The AST server with two CPUs was less effective than with one CPU by about 8 percent. The Wyse, with its slower 486DX2/66 processor, performed about the same with one or two processors.

The underlying problem here is that SCO Unix did not fully support symmetrical processing for network calls. While standard system calls are multithreaded—capable of concurrent execution by more than one processor—the STREAMS interface and underlying TCP/IP software run only on a single, dedicated processor.

According to SCO, when a second processor tries to execute a service process, it will have to turn the process over to the first processor to execute the network system calls, causing the initial processor to reschedule its operations. If rescheduling on the first processor results in a context switch to run the process taken off the second processor, the first processor will be slowed down and the second processor will be left idle. This fact was partly camouflaged in the ServerBench disk tests, which used the network interface to send response packets to the clients, because the large disk cache in the dual-processor servers compensated.

On the processor test alone, the problem did not arise; because the processors had limited overhead network demands. On the network test alone, with no change in the basic setup for the servers in either their one- or two-processor configurations, the only variable at work was the added processor, which had more strenuous tasks to manage and no further aid. With network calls under SCO bound to one processor (a situation SCO fully plans to remedy), the dual-CPU servers experienced no benefit in pure network performance but actually suffered penalties at certain points.

NETWARE RITESIZE

The Ritesize test is an on-line transaction-processing benchmark test. For this issue, Ritesize was based on Sybase SQL Server for NetWare, Version 4.2, running as an NLM (NetWare Loadable Module) under NetWare 3.11. At the time of our testing, this was the most current version of Sybase SQL Server compatible with each of the servers we reviewed.

Sybase SQL Server 10 will be the base of future Ritesize testing performed by *PC Magazine*. For this reason, you should not compare the Ritesize test results in this issue with any other Ritesize results, since such comparisons would not be valid.

Ritesize, like ServerBench, is a client/server test for application servers. The main difference is that ServerBench is a synthetic client/server application, while Ritesize works with a real client/server application.

Another major difference: Because the version of NetWare we used does not support symmetrical multiprocessing, Ritesize was restricted to single-processor configurations. Ritesize uses a read/write ratio of 25:1 and is modeled on an inventory application. The Compaq yielded the highest tps rate with 8 clients, which was most certainly attributable to its fast processor-memory subsystem, but as caching fell off, it tracked the AST as the client load increased and ended almost in a tie for second place. Despite a slower start, the HP was the ultimate leader.

Beyond 12 workstations, the read component in Query 2 of the Ritesize test showed the HP outperforming the Compaq by a factor of 2. The servers' write components were roughly on a par. Since Ritesize uses a read/write ratio of 25:1 in the compilation of its final score, it is clear where the HP gained its edge on this test. Hewlett-Packard has indeed optimized its disk-read ability with a customized Mylex drive controller card in combination with the server's proprietary self-synchronized bus.

At the bottom of the Ritesize performance chart are the Wyse and Unisys servers. With disk operations so important in Ritesize, the design of Unisys's hard disk subsystem appears to have affected it even more on that test than on ServerBench.

How We Tested

To gauge performance of the reviewed application servers, we used two separate kinds of benchmark tests. The first was ServerBench 1.0, Ziff-Davis's most recently developed subsystem-level suite of tests, which was run under SCO Unix. The second was Ritesize III, an OLTP (On-Line Transaction Processing) benchmark test with which we ran Sybase SQL Server for NetWare, Version 4.2, as an NLM (NetWare Loadable Module) under NetWare 3.11.

HARDWARE SETUP

For both ServerBench and Ritesize testing, we used a total of 60 clients—16 386-based PCs and 44 486-based machines. All clients used Eagle NE3200 10BaseT network interface cards, with the exception of the Compaq ProLiant 2000 5/66 M4200A, which came with its own NetFlex-2 adapters. The servers were set up to run 15 clients off each network card (or segment). When running under the SCO Unix operating system, ServerBench requires TCP/IP (Transmission Control Protocol/Internet Protocol) between workstations and the server, so we used FTP Software's PC/TCP Plus, Version 2.2, on all workstations.

SERVERBENCH TESTING

ServerBench is a subsystem-level benchmark test suite that stresses a server's primary components: its processor and memory subsystems, hard disk configuration, and network interface. To test these subsystems, we measure the speed of a series of transactions between the server and its clients to yield both individual and overall scores.

To test the entire system, we run a total of eight subsystem tests: one processor test, five hard disk tests (sequential read, sequential write, random read, random write, and append), and two network tests (client-to-server and server-to-client).

All subsystem tests, except for the processor/memory test, have two parameters. The first is the size of the data "chunks" (not to be confused with blocks) that clients request at a given time; the second is the total size of all the data chunks. All of these transactions are modeled after client/server–type

processes and provide a realistic measure of system performance.

While the ServerBench test scores are a useful means of comparing the servers in this roundup, you should not compare them with other benchmark test scores reported in transactions per second.

To measure the time taken to complete each transaction, we have each client start a timer just before sending a request to the server; the first thing each client does when it receives a response is stop the timer. To calculate the average transaction-per-second rate for each subsystem, we divide the timing for each subsystem test by the number of times that test was executed.

To generate an overall system score, ServerBench executes a mix of operations that places stress on strategic subsystems, with heavy emphasis on the server's processor, memory, and disk components. (Because network operations contribute little to network performance in real-life client/server environments, these operations play only a small role in determining the ServerBench score.)

We compute the ServerBench score for each server by calculating the weighted harmonic mean of the individual subsystem scores.

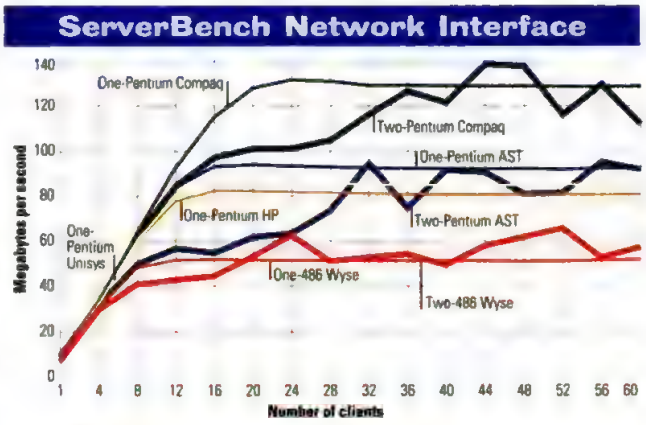
RITESIZE TESTING

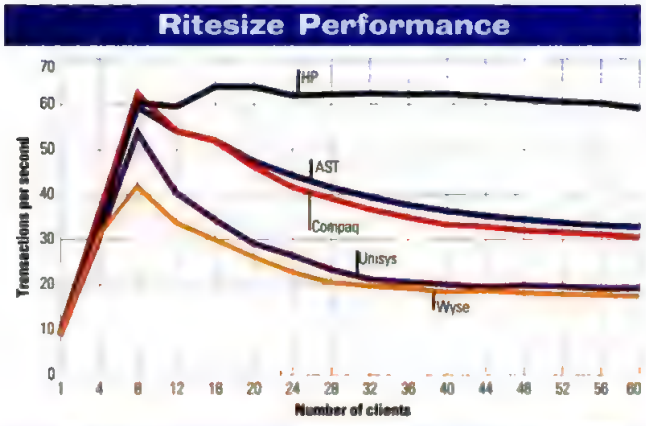
Like ServerBench, Ritesize stresses strategic server components that influence real-life client/server performance. Each server's network subsystems, however, play no part in the Ritesize score. Ritesize is strictly a measure of a server's database query and processing ability.

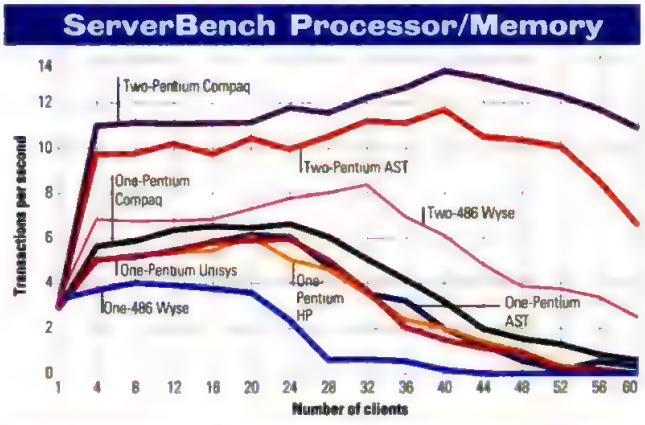
True to its aim, Ritesize uses an OLTP workload with a 25:1 read/write ratio. It is modeled after an inventory application and consists of three query types:

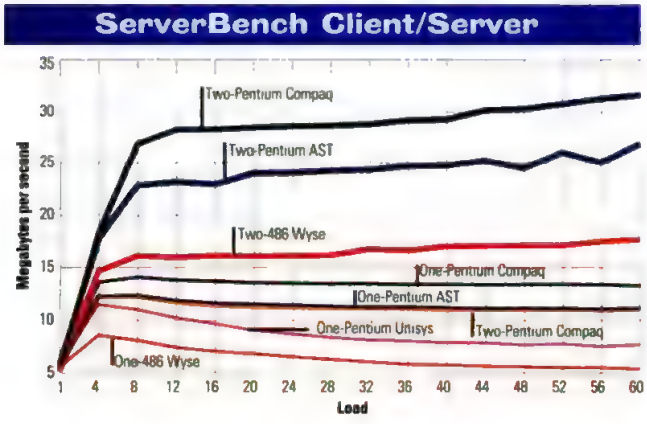
- Query 1 stresses the CPU by working with a small set of data that is easily cached, meaning that the hard disk is not a bottleneck for this portion of the test.
- Query 2 performs a join on two large tables, which causes a large number of random disk reads and writes.
- Query 3 updates a single row in place. No index changes or fragmentations occur, so the test can be repeated if necessary without rebuilding the data.

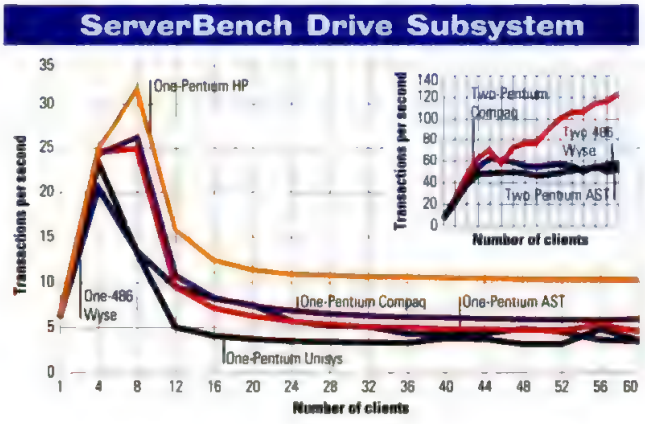
Since the version of NetWare used in this test does not support symmetrical multiprocessing (SMP), none of the two-processor servers in this lineup received a separate score for their dual-CPU configurations on the Ritesize test.











The Toshiba T4700C Series

Introducing a notebook so powerful, it breaks the sound barrier.

T4700CT

- 9.5" TFT-LCD active matrix color display

T4700CS

- 9.5" Dynamic-STN dual-scan color LCD display

Both Models

- 50MHz SL Enhanced i486™DX2
- 8MB RAM (expandable to 24MB)
- 200/320MB HDD
- Two PCMCIA slots (16mm and 5mm)
- Integrated graphics accelerator
- VL local-bus video
- Built-in microphone
- Wave™ audio capabilities
- Audio jacks: headphone/speaker and microphone
- NiMH battery for extended life
- QuickCharge battery recharge system
- 3.5" 1.44MB floppy disk drive
- BallPoint™ 2.0 mouse with QuickPort™
- MaxTime™ Power Management system
- LCD status icon bar
- DOS™6.0, Windows™ and Microsoft® Sound System™ software pre-installed

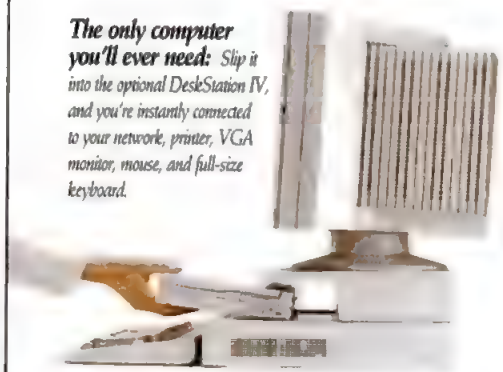
3 YEAR LIMITED WARRANTY

Blazing 50 MHz: *Run with the power of the SL Enhanced i486™DX2 – the fastest microprocessor ever designed specifically for notebook computers.*

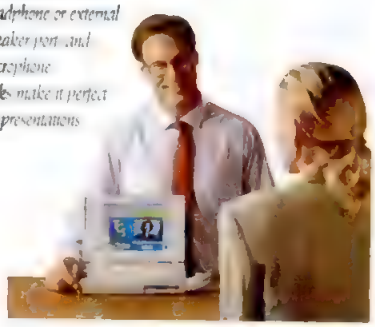
Two separate PCMCIA slots: *A 16mm and a 5mm slot are your keys to expansion, now and into the future—for modems, storage and more.*

intel inside

The only computer you'll ever need: *Slip it into the optional DeskStation IV, and you're instantly connected to your network, printer, VGA monitor, mouse, and full-size keyboard.*

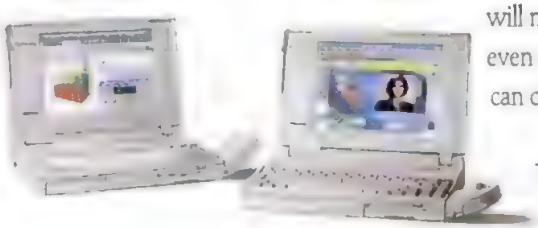


A multimedia roadshow: *Wave audio compatibility, headphone or external speaker port and microphone jacks make it perfect for presentations.*



This is it! The most powerful notebook you've ever heard. The Toshiba T4700C Series can run your most intense applications— or even help you run a presentation.

With its SL Enhanced i486™DX2 50MHz processor, it easily handles graphics-rich programs as well as spreadsheets. The built-in multimedia capabilities let you create and give breakthrough presentations anywhere. The renowned Toshiba color displays will make all your work shine. And there's even a full 3-year limited warranty so you can carry it with complete confidence.



With so much going for it, buying a T4700C Series notebook is obviously a sound decision.

For a dealer, call 1-800-457-7777.

In Touch with Tomorrow

TOSHIBA

© 1993 Toshiba America Information Systems, Inc. All products indicated by trademark symbols are trademarked and/or registered by their respective companies.

CIRCLE 379 ON READER SERVICE CARD

AST Research Inc.

AST Manhattan SMP P/60

Designed to support both small and large networks, the AST Manhattan SMP P/60 server offers solid performance and room to grow.

With room for 16 hard disk bays and support for up to five Pentium chips and 488MB of error-code correcting memory, this is a server sized to replace a mainframe. The system supports up to 32GB of disk storage internally, but additional hard disk storage can be added with an external chassis. Its eight proprietary, eight EISA, and two ISA slots provide enough expansion potential for even the most demanding configurations of a PC-based network.

The Manhattan's lockable side panel easily slides open, and there is ample room for cables and internal components. The front panel, also lockable, swings open to allow direct access to its hot-swappable hard disks.

One of the Manhattan's major selling points is its fully passive 64-bit backplane, which makes the system adaptable to future technologies. The 240-pin connector for AST's processor and memory cards, however, proved fragile during our testing; a bent pin on the backplane necessitated the replacement of the entire backplane. And we encountered minor start-up difficulties, including parity errors, lock-ups during boot-up, and network interface card configuration problems.

While AST Research claims its fault-tolerant features are comparable with those of a super-server, ECC memory, hot-swappable hard disks, and RAID 5 support are found on most of the other tested systems as well. This is, however, the only reviewed system that offers a redundant power supply. If one supply fails, the other will keep the server running.

The Manhattan did well on our performance tests. On our NetWare-based Ritesize test, it outperformed every tested system except the HP NetServer 5/60 LM in terms of I/O performance. Under SCO Unix, which supports multiple processors, our ServerBench test suite showed that the

FACT FILE

AST Manhattan SMP P/60
AST Research Inc.;
800-876-4278, 714-727-4141.

Estimated price (tested configuration): $48,000
Configuration: Two Pentium/60 processors, 128MB RAM with 256K write-back cache, four 1GB Quantum ProDrive 1050S Fast SCSI-2 hard disks, Mylex DAC960 EISA SCSI controller with 4MB cache, 1 44MB floppy disk drive, Sony CDU-540 CD-ROM drive, 1GB Wangtek tape drive, two 625-watt power supplies
In short: A good design with ample room for expansion
443 ON READER SERVICE CARD

LABELS FOR THE JET SET.

You look marvelous.

The label on your envelope communicates a lot more than an address. Now Avery Ink Jet Labels can make that first impression a lasting one.

New Avery Ink Jet Labels print crisp and clean, in black or in color, from your Hewlett Packard DeskJet, Canon® Bubble Jet,™ or other popular ink jet printer. Built-in Avery templates in WordPerfect,® Microsoft® Word, and other leading software programs make them easy to format. Choose from a variety of white or clear addressing and shipping labels.

Call 1-800-462-8379 for a FREE sample pack. Joining the Jet Set has never been easier.

AVERY

NEW AVERY INK JET LABELS

CIRCLE 129 ON READER SERVICE CARD

two-Pentium Manhattan outperformed every system but the two-Pentium Compaq ProLiant 2000 5/66 M4200A. The Manhattan's solid performance was based on a combination of its processor (second in performance to the ProLiant, which uses a wider memory bus) and its hard disk setup (surpassed in performance by only the NetServer and the ProLiant). The Manhattan's high disk score is due mainly to its Mylex DAC-960 controller. The Manhattan's performance also scaled well from one to two Pentium chips.

AST Manhattan SMP P/60

SUITABILITY TO TASK	
NetWare performance	GOOD
SCO Unix performance	GOOD
Expandability	EXCELLENT

In sum, the Manhattan proved itself to be one of the fastest machines in this roundup—and one with a solid design for the future.—*Tim Stefanini*

Compaq Computer Corp.

Compaq ProLiant 2000 5/66 M4200A

The new ProLiant line of servers occupies the highest level of Compaq's PC server food chain, above the low-end ProSignia line and the midlevel SystemPro XL line, which is being phased out. The ProLiant series consists of three models—the 1000 (with a single processor), 2000 (with two processors) and 4000 (with four processors)—each designed to meet a particular demand level. Our Compaq ProLiant 2000 5/66 M4200A came with two Pentium/66 processors.

The system's case is spacious, with five internal and three external drive bays. Four of the five internal drive bays were filled with hot-swappable 1GB hard disks; of the three external drive bays, one was occupied by a 1.44MB floppy disk drive and another by a CD-ROM drive.

The Compaq motherboard provides integrated controllers for general I/O (two serial, one parallel), keyboard, mouse, video, and both internal and external SCSI connectors. Of the eight bus-mastering EISA slots, one is filled with Compaq's Smart SCSI array controller, four with Compaq NetFlex-2 network interface cards. The unit also offers four proprietary slots: two for CPU cards, one for memory expansion, and one for a network-management modem.

Memory is expandable from 16MB (for 486-based systems) or 32MB (for Pentium systems) to a maximum of 512MB of ECC memory. Using Compaq's ServerCache-2 design, each CPU has 256K of two-way, set-associative, write-back external cache. The system uses Compaq's TriFlex architecture, which has an ultrawide 128-bit path

With Backpack's unique printer port connection, family support has never been easier.

Adding additional storage to your IBM compatible, laptop or notebook has never been easier. The *backpack*™ family of no-slot drives plugs directly into your parallel printer port to provide you with additional storage instantly. Using them one at a time, or daisy chaining up to four together, there are no interface cards to install so you don't have to open the cabinet of your computer. And because your printer attaches directly to the *backpack* drive, you don't have to disrupt your print operations. With the *backpack* family of diskette, hard, tape or CD-ROM drives, you can easily transport your information wherever you go—just plug *backpack* into the parallel printer port of any IBM compatible or portable. And, of course, all *backpack* drives work with Windows.™ With *backpack*, there's no hassle. Just sit back and enjoy the new member of the family.

Just plug and play. It's the no-hassle approach to additional storage.

MicroSolutions

132 W. Lincoln Hwy. DeKalb, Illinois 60115 Telephone 815.756 3411 FAX 815 756 2928
Call Toll Free 800.293.1214

CIRCLE 855 ON READER SERVICE CARD

FACT FILE

Compaq ProLiant 2000 5/66 M4200A

Compaq Computer Corp.; 800-345-1518, 713-378-8820.

Estimated street price (tested configuration): $30,392.

Configuration: Two Pentium/66 processors, 128MB RAM with 256K write-back cache, four 1GB Micropolis Model 2112 Fast SCSI-2 hard disks, Compaq Smart SCSI Array EISA controller with 4MB cache, 1.44MB floppy disk drive, Compaq CDU561-31 CD-ROM drive, four Compaq NetFlex-2 network interface cards, 445-watt power supply.

In short: With expandability to four CPUs and scorching performance results, the Compaq ProLiant 2000 5/66 M4200A is a winner inside and out.

444 ON READER SERVICE CARD

between the CPU and main memory. The Compaq Smart SCSI array controller with 4MB of RAM supports RAID levels 0, 1, 4, 5, and 10. The unit comes with excellent management tools, including SmartStart (CD-based network operating system software) and Insight Manager, which monitors the server and can predict failures.

Compaq ProLiant 2000 5/66 M4200A

SUITABILITY TO TASK	
NetWare performance	GOOD
SCO Unix performance	EXCELLENT
Expandability	FAIR

On our single-CPU NetWare-based Ritesize test, the Compaq came in third place—behind the AST Manhattan SMP P/60 and the HP NetServer 5/60 LM. On our ServerBench test suite, which runs under SCO Unix—an operating system that supports multiple CPUs—the Compaq was clearly ahead of the test pack. With a single CPU, the system peaked at about 20 clients. Network performance improved with the addition of a second CPU, but not by much.

Both processor and disk performance, however, benefited greatly from the use of the second CPU. The dual-CPU ProLiant turned in the highest processor and disk scores of all the systems reviewed. With its top-rate performance and excellent array of features, this unit is a clear winner.—*Amarendra Singh*

SUMMARY OF FEATURES CONTINUES

Application Servers

List price (tested configuration) We report the prices for the application server systems configured the way we tested them. Some vendors provide an estimated selling price instead of a list price to reflect more accurately what customers should expect to pay for the system.

Power supply (and number of connectors) We report the wattage of each power supply and the number of connectors for each. The number of connectors directly affects how many devices, such as hard disks, floppy disk drives, and CD-ROM drives, the server can power. A secondary or *redundant* power supply automatically takes over if the primary supply fails.

Processor While each of the five application servers in this roundup supports multiple processors, some of the vendors opted to submit their systems with only one.

Installable RAM indicates the range of system memory that each server supports. Some of the tested application servers use memory cards in addition to motherboard-mounted memory to reach the maximum level of supported RAM.

Installable external RAM cache per CPU Unlike with RAM, where all processors share the same memory space, each processor is allocated its own external (or Level 2) RAM cache, the amount of which can directly affect processor performance.

We indicate the data path width and the type of architecture used by the **CPU bus,** which connects the CPU to the system memory. A wider data path lets more information flow through the bus.

Primary and secondary expansion-bus architecture refers to the bus that connects the I/O slots to the CPU. All five reviewed application servers use EISA as the primary architecture and include additional, proprietary architectures to accommodate memory cards, extra processors, and other special-purpose cards.

Bus-mastering slots offer another way to increase a computer system's processing speed by accepting expansion cards containing additional circuitry. This bus-mastering circuitry lets the card control its own read/write operations, freeing the CPU to handle other tasks. Most PCs use non-bus-mastering slots, which means that the main processor controls the expansion cards' read/write operations.

Local-bus slots include proprietary, VL-Bus, and PCI designs.

Other slots account for the remaining expansion slots, which use proprietary, special-purpose designs.

Maximum number of installable hard disks indicates the number of hard disks the system is capable of supporting.

We list the **hard disk manufacturer and type,** and the size of the **hardware cache** built into the hard disk that the vendor included with its application server.

RAID levels supported Depending on the configuration, or level, of the RAID (Redundant Array of Inexpensive Disks), different combinations of data security and speed features can be built into the hard disk subsystem. Some of these features include disk mirroring, parity checking, and data striping. Note that a higher RAID level number does not necessarily indicate a better-performing or more efficient RAID design. The **RAID implementation** can be handled by hardware, software, or both.

Fault tolerance means that a system or subsystem can continue to function even though a part of it has failed. We list whether or not the **processors, drives, controllers,** and **power supply** are fault-tolerant.

A server featuring **system-management notification** will alert the network administrator when special conditions or problems occur. Some servers offer remote notification, which notifies the administrator of these conditions or problems via a modem.

A **temperature sensor** monitors the temperature inside the server's chassis. If the temperature exceeds a particular point, a fan is activated. Some servers will also notify the network administrator that the server is overheating.

Fight Instant Obsolescence

Retail Price: $29.95 ISBN: 1-56276-108-0

Is your computer wilting under the memory demands of Windows? These days some PCs are practically obsolete by the time you get them home! The good news is best-selling author Dale Lewallen is here to show you how to turn that aging workhorse of a PC into a blazingly fast racehorse, eager to run today's high-performance software and peripherals. In *This Old PC* you'll learn step-by-step how easy and inexpensive it can be to upgrade your system for years of added performance. Plus you'll get a disk that contains programs to tell you what's inside your computer and utilities for upgrading your system through software.

Available at all fine bookstores, or call 1-800-688-0448, ext. 8169.

*Quantity discounts available. Sales tax will be added where applicable.

ZIFF DAVIS ZD PRESS

©1993 Ziff-Davis Press

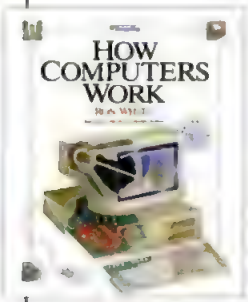
Imagination. Innovation. Insight.

The How It Works Series from Ziff-Davis Press

"... a magnificently seamless integration of text and graphics ..."

Larry Blasko, The Associated Press, reviewing *PC/Computing How Computers Work*

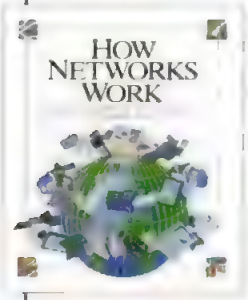
No other books bring computer technology to life like the *How It Works* series from Ziff-Davis Press. Lavish, full-color illustrations and lucid text from some of the world's top computer commentators make how It works books an exciting way to explore the inner workings of PC technology



ISBN: 094-7 Price: $22.95

PC/Computing How Computers Work

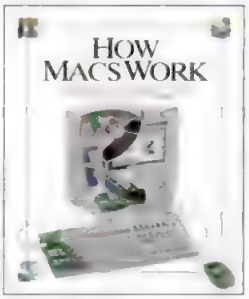
A worldwide blockbuster that hit the general trade bestseller lists! *PC/Computing* magazine executive editor Ron White dismantles the PC and reveals what really makes it tick.



ISBN: 129-3 Price: $24.95

How Networks Work

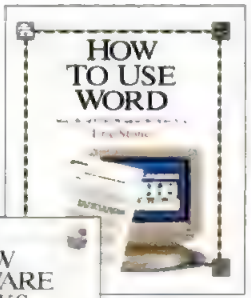
Two of the most respected names in connectivity showcase the PC network, illustrating and explaining how each component does its magic and how they all fit together.



ISBN: 146-3 Price: $24.95

How Macs Work

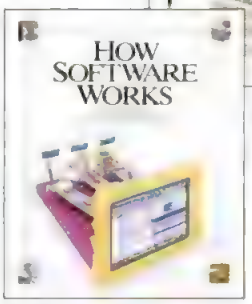
A fun and fascinating voyage to the heart of the Macintosh! Two noted *MacUser* contributors cover the spectrum of Macintosh operations from startup to shutdown.



ISBN: 184-6 Price: $17.95

How Software Works

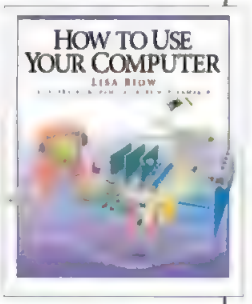
This dazzlingly illustrated volume from Ron White peeks inside the PC to show in full-color how software breathes life into the PC. Covers Windows™ and all major software categories.



ISBN: 133-1 Price: $24.95

How to Use Your Computer

Conquer computerphobia and see how this intricate machine truly makes life easier. Dozens of full-color graphics showcase the components of the PC and explain how to interact with them.



ISBN: 155-2 Price: $22.95

All About Computers

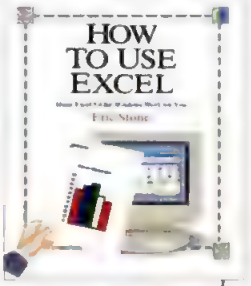
This one-of-a-kind visual guide for kids features numerous full-color illustrations and photos on every page, combined with dozens of interactive projects that reinforce computer basics, making this an exciting way to learn all about the world of computers.

ISBN: 166-8 Price: $15.95

How To Use Word

Make Word 6.0 for Windows Work for You!

A uniquely visual approach puts the basics of Microsoft's latest Windows-based word processor right before your eyes. Colorful examples invite you to begin producing a variety of documents, quickly and easily. Truly innovative!



ISBN: 185-4 Price: $17.95

How To Use Excel

Make Excel 5.0 for Windows Work for You!

Covering the latest version of Excel, this visually impressive resource guides beginners to spreadsheet fluency through a full-color graphical approach that makes powerful techniques seem plain as day. Hands-on "Try It" sections give you a chance to sharpen newfound skills.

Available at all fine bookstores or call 1-800-688-0448, ext. 81672.

© 1993 Ziff-Davis Press

ZIFF-DAVIS ZD PRESS

SUMMARY OF FEATURES

Application Servers

PC MAGAZINE EDITORS' CHOICE

Products listed in alphabetical order ■ = YES □ = NO	AST Manhattan SMP P/60	Compaq ProLiant 2000 5/66 M4210A	HP NetServer 5/60 LM	Unisys PW2 2 Advantage Plus Model 5602	Wyse Series 7000i Model 760MP
List price (tested configuration)	$48,000 (estimated)	$30,392 (estimated)	$23,153	$17,745	$26,650 (estimated)
Power supply (and number of connectors)	Two 625W (8)	445W (8)	386W (7)	415W (8)	500W (6)
Processor, Memory, Bus					
Processor	Two Pentium/60	Two Pentium/66	One Pentium/60	One Pentium/60	Two Intel 486DX2/66
Installable RAM	16MB–448MB	32MB–512MB	4MB–384MB	8MB–192MB	16MB–512MB
Installable external RAM cache per CPU	256K	256K	256K	256K	0–256K
CPU bus	64-bit Cupid MPX	64-bit Compaq Triflex	32-bit Intel	64-bit proprietary	64-bit proprietary
Primary and secondary expansion-bus architecture	EISA/ISA, proprietary	EISA, proprietary	EISA, proprietary	EISA, proprietary	EISA, proprietary
Number of bus-mastering and non-bus-mastering slots	6, 2	8, 4	8, 0	7, 1	6, 3
Local-bus slots	None	None	None	None	1
Other slots	Two 16-bit ISA	Four 64-bit proprietary	Two 32-bit proprietary	None	Six 64-bit proprietary
Hard Disks					
Maximum number of installable hard disks	16	5	6	8	6
Disk manufacturer and type	Quantum Fast SCSI-2	Micropolis Fast SCSI-2	Seagate Fast SCSI-2	Seagate Fast SCSI-2	Fujitsu Fast SCSI-2
Hardware cache	512K	512K	256K	256K	512K
Disk array:					
Capacity per disk	1GB	1GB	1GB	1GB	1GB
RAID levels supported	0, 1, 5, 6	0, 1, 4, 5, 10	0, 1, 5, 6	1	0, 1, 3, 5
RAID implementation	Hardware	Hardware	Hardware, software	Hardware	Hardware
Software					
Certified for DOS, NetWare, and Unix	■	■	■	■	■
Other compatible operating systems	Microsoft Windows NT, OS/2, VINES	Microsoft LAN Manager, Microsoft Windows NT, OS/2, SCO Open Desktop, SCO Open Server, VINES	IBM LanServer, Microsoft LAN Manager, Microsoft Windows NT, VINES	Microsoft Windows NT, Solaris	Microsoft Windows NT
Fault Tolerance and Management					
Processors	□	■	□	□	■
Drives	■	■	■	□	■
Controllers	■	■	□	□	□
Power supply	■	■	□	□	□
System-management notification	■	■	□	□	□
Temperature sensor	■	■	□	□	■
Warranty	3 years	3 years	3 years	1 year	1 year
On-site service	Included (3 years)	Included (3 years)	Included (3 years)	Included (1 year)	Included (1 year)

Hewlett-Packard Co.

HP NetServer 5/60 LM

Based on an Intel motherboard design and currently limited to a single processor, the HP NetServer 5/60 LM is a good all-around file and application server. Hewlett-Packard Co. plans to offer a dual-processor design later this year.

Expandability is the NetServer's strong suit. The unit's mid-height, double-width tower case included seven half-height 5.25-inch drive bays and one 3.5-inch bay. On our test machine, the bays were filled with four 1GB SCSI-2 hard disks, a 1.44MB floppy disk drive, and a CD-ROM drive, leaving two bays open. Given the power consumption of current devices, the NetServer's 386-watt, seven-connector power supply should be adequate.

The unit offers eight EISA bus-mastering slots, four of which we filled with network interface cards and one of which we filled with HP's drive array controller. Since all basic I/O ports (two serial ports, one parallel port, IDE drive controller, floppy disk drive controller, both internal and external SCSI ports, and video) are integrated on the motherboard, three expansion slots are left free. The motherboard has four SIMM sockets, and additional memory expansion is available through an expansion board. The system can support up to 384MB of

FACT FILE

HP NetServer 5/60 LM
Hewlett-Packard Co.; 800-752-0900.

List price (tested configuration): $23,153.
Configuration: One Pentium/60 processor, 128MB RAM with 256K write-back cache, four 1GB Seagate Wren ST11200N/ND Fast SCSI-2 hard disks, Hewlett-Packard HPC3310-60024 EISA SCSI disk array controller with 4MB cache, 1.44MB floppy disk drive, Hewlett-Packard HP C2226A CD-ROM drive, 386-watt power supply.
In short: The HP NetServer 5/60 LM is an excellent choice as a midrange file and application server that will soar when it becomes capable of integrating a second processor.

445 ON READER SERVICE CARD

system memory. The test unit used a 60-MHz Pentium processor and 256K of external cache.

On our NetWare-based Ritesize test, the NetServer, with its superb disk array system, was by far the best performer. As the network approached full load, the NetServer easily outperformed its closest competitors—the Compaq ProLiant 2000 5/66 M4200A and the AST Manhattan SMP P/60. If your application places heavy demands on your system's hard disk, and if you're looking for a server that provides NetWare file services, the NetServer is clearly a good choice.

HP NetServer 5/60 LM

SUITABILITY TO TASK	
NetWare performance	EXCELLENT
SCO Unix performance	FAIR
Expandability	FAIR

The NetServer's current lack of scalability, however, is a drawback. On our SCO Unix-based ServerBench tests, the NetServer was able to shine only in the area of disk performance, where it outdid its single-processor rivals. When a second CPU was added to the other test machines, however, even the Wyse Series 7000i Model 760MP with its two 486DX2/66 chips was able to take a significant lead over the NetServer on these tests.

In terms of network throughput, the NetServer came in ahead of only the 7000i in both single- and dual-processor mode, although it performed more consistently than did the dual-Pentium Manhattan. On the processor tests, while the NetServer performed respectably against the single-processor machines, the addition of a second processor allowed even the 7000i to move ahead of it.

In sum, the NetServer proved itself to be a worthy application server. Until Hewlett-Packard releases a multi-CPU unit, however, its ability to compete may be limited.—*AS*

Unisys Corp.

Unisys PW² Advantage Plus Model 5608

The $17,745 Unisys PW² Advantage Plus Model 5608 from Unisys Corp. is a basic Pentium application server that makes its mark in terms of value. It is appropriate for smaller, less demanding networks.

In designing the Advantage Plus series of servers, Unisys took a modular approach: The processor and its external cache come on a single daughterboard while system memory (expandable to 192MB) resides on the motherboard. This design allows users to upgrade the processor or system memory with minimal effort.

The tested system had a single 60-MHz Pentium with 256K of external cache. Although the dual-Pentium version will not be available until later this year, the slot for the second Pentium cooling fan shows that the chip's presence was accounted for in the overall design of this machine. The memory board in our tested configuration came with 128MB of RAM and used 16MB SIMMs. The system comes also with eight standard EISA slots, but with four network cards installed for testing—as well as the SCSI adapter—only three of the EISA-bus expansion slots were left empty.

Unisys PW² Advantage Plus Model 5608

SUITABILTIY TO TASK	
NetWare performance	FAIR
SCO Unix performance	POOR
Expandability	POOR

Slightly wider than a standard tower case, the Advantage Plus sports an internal design that allows for easy access to boards. The extra space was wasted, however, because the four 1.2GB hard disks used in our test system could easily have fit within the confines of a standard-width tower. This application server also came equipped with a 415-watt power supply that included eight power connectors. There are three external and five internal drive bays.

The Advantage Plus has an integrated Adaptec 7770P SCSI controller, and our test configuration came with an Adaptec 1740 SCSI adapter card. Although this card supports SCSI-2, it does not support the RAID 0 configuration upon which we standardized our testing. We were obliged to use Novell's RAID configuration utility, and this performance disadvantage was reflected in the overall test results.

On our NetWare-based Ritesize test, the Advantage Plus showed the weakest performance of all the Pentium systems. The system peaked at approximately 54 transactions per second with eight clients. Performance fell off sharply as additional clients were added to the system.

With these additional clients, the Advantage Plus's performance dropped off almost enough to allow the 486-based Wyse Series 7000i Model 760MP to catch up. During ServerBench testing, which ran under SCO Unix, the Advantage Plus's performance fell midway between that of the other Pentium systems and that of the 486-based 7000i across the spectrum of functional tests.—*Mark Jonikas*

FACT FILE

Unisys PW² Advantage Plus Model 5608

Unisys Corp.; 800-874-8647, ext. 911.

List price (tested configuration): $17,745.

Configuration: One Pentium/60 processor, 128MB RAM with 256K write-back cache, four 1GB Seagate ST11200N/ND Fast SCSI-2 hard disks, integrated Adaptec 7770P SCSI controller, Adaptec 1740/24A EISA SCSI controller, 1.44MB floppy disk drive, Hitachi CDR3750 CD-ROM drive, 415-watt power supply

In short: The least expensive application server of the bunch, the Unisys PW² Advantage Plus Model 5608 is one of the most cost-effective Pentium entries on the market

446 ON READER SERVICE CARD

THE ONE WITH THE MOST TOYS WINS.

VS15 color monitor (1024 x 768, .28mm, NI)

340MB hard drive and 256KB external cache

7 expansion slots (5 available)

VL #9GXE video accelerator card with video control panel software

50MHz processor with 8MB of RAM

Multi-session, double-spin CD ROM drive

One diskette drive (3.5")

Sound Blaster 16-bit CD-quality audio card

Peavey® amplified speakers

Labtec Dynamic microphone

$2,799

Just in case you missed the price in all of the excitement, we'd be happy to show you one more time: $2,799. (Business Lease◊: $104/Mo.).

You might find some other multimedia systems out there. But you won't find anything in the same league as the Dell Dimension™ XPS 450V. At least not for the price.

And it's just one of a whole family of affordably priced Dell multimedia systems.

Each one configured to give you more blast for your dollar. From the company that ranked highest in the 1993 J.D. Power and Associates Desktop Personal Computer Satisfaction Study among business users†.

Call to order your Dell Dimension XPS 450V today. And come out a winner.

DELL™

TO ORDER, CALL

800-433-5899

HOURS MON-FRI 7AM-9PM CT SAT 10AM-6PM CT SUN 12PM-5PM CT

IN CANADA* CALL 800-668-3021 KEYCODE #11BKV

intel inside

Order Code #5000451

†1993 J.D. Power and Associates Desktop Personal Computer Satisfaction Study conducted among business users and based on 1,956 user respondents. *Prices valid in the U.S. only. Some products and promotions not available in Canada. ◊Business leasing arranged by Leasing Group, Inc. The Intel Inside logo is a registered trademark of Intel Corp. Peavey is a registered trademark of Peavey Electronics Corp. Dell disclaims proprietary interest in the marks and names of others. ©1994 Dell Computer Corporation. All rights reserved.

DON'T "LOGIN" WITHOUT US.

PTR Prentice Hall has the right Internet book for you. Let us take you to your cyberspace destination.

ZEN AND THE ART OF THE INTERNET: A Beginner's Guide, Third Edition

Brendan P. Kehoe

ISBN 0-13-121492-6

THE beginning guide to the Internet. The first Internet book published, now in its third edition Over 50,000 copies sold!

HANDS-ON INTERNET: A Beginning Guide for PC Users

David Sachs and Henry Stair

ISBN 0-13-056392-7

Sachs and Stair guide you through the Internet with eight on-line sessions. Includes free full connectivity software Telix Lite

A DOS USER'S GUIDE TO THE INTERNET: Email, Netnews, and File Transfer With UUCP

James Gardner

ISBN 0-13-106873-3

Use the advanced DOS communications software from MKS, Inc. (included) to cruise the Internet like never before.

ALSO FROM PTR PRENTICE HALL:

Internet: Getting Started Updated Edition, April Marine, Vivian Neou, and Carol Ward, all SRI International ISBN 0-13-289596-X

Internet: Mailing Lists, Revised 1993 Edition, Edward T.L. Hardie and Vivian Neou, SRI International ISBN: 0-13-289661-3

For more information about our Internet books or to locate a store near you contact us via the Internet by FTP (ftp.prenhall.com) or by Gopher (gopher.prenhall.com).

PTR PH

AVAILABLE AT BETTER BOOKSTORES.

CIRCLE 294 ON READER SERVICE CARD

Wyse Technology Inc.

Wyse Series 7000i Model 760MP

While its 486-class processors make it look like a dinosaur next to Pentium-based servers, the Wyse Series 7000i Model 760MP proves its fitness to survive in this competitive field by offering dependability, solid performance, and a very attractive price.

In early 1994, Wyse expects to release Pentium boards for the 7000i that will bring present systems up a rung on the PC-server performance ladder. Adding a Pentium won't create any data-flow bottlenecks, because the 7000i already comes equipped with a 64-bit processor bus to support the Pentium chip's wider data path.

The 7000i, which comes with a 500-watt power supply with six connectors, is a versatile server that can accommodate up to five 486 processors. System memory can be expanded to 512MB, and the tower case has six drive bays. When it is loaded with four network interface cards and two CPU cards, however, there are no available EISA slots.

Wyse Series 7000i Model 760MP

SUITABILITY TO TASK	
NetWare performance	FAIR
SCO Unix performance	FAIR
Expandability	POOR

FACT FILE

Wyse Series 7000i Model 760MP

Wyse Technology Inc.;
800-438-9973, 408-473-1200.

List price (tested configuration): $26,650 (estimated)
Configuration: Two Intel 486DX2/66 processors, 128MB RAM with 256K write-back cache, four 1GB Fujitsu M2694ESA Fast SCSI-2 hard disks, Distributed Processing Technology DPT 2012B/90 EISA SCSI controller with 512K cache, 1.44MB floppy disk drive, Toshiba 3301B CD-ROM drive, four Eagle NE3200 network interface cards, 500-watt power supply
In short: This 486-based system really shines, even when up against Pentium servers

447 ON READER SERVICE CARD

On our NetWare-based Ritesize test, the 7000i performed well at smaller client loads, lagging an expected 30 percent behind the Pentium systems. At larger loads, however, the 7000i closed the performance gap, making it a value choice for large networks. This excellent scalability is largely the result of the 7000i's SCSI-2 controller, which provided faster disk striping of data than did the other application servers that we tested.

The SCO Unix–based, ServerBench tests offered a glimpse into the relative performances of single- and dual-processor configurations. With a single processor, the 7000i turned in low scores—the result of its 486 CPU competing against Pentium processors. When a second 486 CPU was added, however, the 7000i outperformed all of the single-Pentium systems—60-MHz and 66-MHz—by wide margins.

On the ServerBench performance test, which includes processor, disk, and network transactions, the dual-486 7000i found itself a niche between the single-Pentium Compaq ProLiant 2000 5/66 M4200A and the dual-Pentium AST Manhattan SMP P/60. The explanation for this level of performance lies in the unit's disk subsystem, which outperformed the dual-Pentium Manhattan at a full client load of 60 workstations.

The 7000i was robust, suffering none of the configuration and reliability problems that plagued some of the other Pentium-based servers. It worked when it arrived, and it continued to work, no matter what operating system we installed or how many tests we ran.

This is a third-generation server, built on solid, proven technology, and it shows. The Wyse Series 7000i Model 760MP offers a value alternative to this year's sexiest systems.—*Michael Blakeley* □

How do you share your WordBasic macros? This issue's Extending Your Apps column describes a Word for Windows template that makes it easy to copy any number of macros to any number of destination templates.

User-to-User

BY NEIL J. RUBENKING

Browsing Windows Help Files

Here's a little-known tip I ran across the other day: Adding the line `SeqTopicKeys=1` to the [Windows Help] section of your WIN.INI file enables two special keys in WinHelp. Now Ctrl-Shift-Home will go to the first topic in the active Windows Help file, and Ctrl-Shift-Right Arrow will sequentially read through all the topics as they appear in the file.

Apparently this is a debugging switch that allows Help authors to examine all their topics in the WINHELP engine *without* having to code browse sequences for them all. I like browsing through Help files in new applications, but lately a lot of them have been omitting the Browse buttons. This switch forces the issue!

John Colletti
Southfield, Michigan

▶PC MAGAZINE: When two or more pages in a Windows Help file follow each other in logical order, the Help-file author *should* code a browse sequence for those pages. If the current page is part of a browse sequence, the Browse buttons (marked with << and >>) will be enabled, and pressing them will move back and forth among the pages included in the browse sequence. This tip allows you to browse through a Help file even when the author didn't include browse sequences. It also lets you be sure you've seen every page of a Help file—just start at the beginning and page through until you get the warning, "Help topic does not exist!"

Open WIN.INI in Notepad, search for the line [Windows Help], and insert `SeqTopicKeys=1` on the next line. As soon as you save the file, this feature becomes available—you don't have to restart Windows. To page through the topics you must hold down Ctrl and Shift and press the Right Arrow Key on the *movement* keypad, not the one on the numeric keypad. There's no equivalent key for stepping through the topics backwards, but if you went too far while browsing forward, the Back button (or Alt-B) will take you back.

When pages in a Windows Help file follow each other in logical order, a browse sequence should be coded for them.

▶ IN THIS SECTION

Tutor 311
Extending Your Apps 317
Toolkits 321
Environnments 322
Utilities 327
Solutions 333

Count on It

In the January 12, 1993, issue of *PC Magazine*, you printed a technique for creating a batch file that could keep count of how many times it was run, though the batch file used four different files to accomplish this. You then presented an improved version that used only two extra files and provided some additional capabilities as well. I saw this as a challenge and was able to come up with a solution that requires only *one* file—COUNT.BAT, which is shown in Figure 1. COUNT.BAT works in essentially the same way as the original program, but it keeps all of its program and data lines in the batch file.

The problem I had to solve was finding a way to let the batch file modify itself, and I discovered that one of the tricks used to find the count could also be used as a filter. The original scheme used the FIND command with the /C option to count the lines of the data file that contained a 1. Incrementing the count was accomplished by adding a line to the data file. I used another capability of the FIND command, the /V option, to initialize the batch file by rebuilding it *without* any data. When the program is run, it can append the data to the end of the file.

This capability is potentially even more powerful. For instance, by assigning different data types, you could count many types of data. Note that the search string for the FIND command must be built using an environment variable. Otherwise, extra data points will initially be introduced, and the lines that contain the

COUNT.BAT

Complete Listing

```
@ECHO OFF
REM COUNT.BAT - counts the number of times it has been executed

REM ************************************************************************
REM  This is a self modifing batch file.
REM  Make a backup before running to prevent loss of time and effort.
REM ************************************************************************
SET datatype=1

REM The following line will increment the count.
ECHO rem data - %datatype% >> COUNT.BAT

IF NOT "%1" == "0" GOTO :skipinit
REM The following line will initialize the file.
FIND /V "data - %datatype%" < COUNT.BAT > COUNT.BAT
:skipinit

REM The following lines will store the count in the environment.
FIND /C "data - %datatype%" COUNT.BAT > counttmp.bat
ECHO SET count=%%2 > --------.BAT
CALL COUNTTMP.BAT
DEL COUNTTMP.BAT
DEL --------.BAT

REM The following line will display the results.
ECHO Current count is: %count%
SET datatype=

REM This is the start of the data.
```

Figure 1: **The COUNT batch file keeps track of the number of times it has been executed, without requiring any auxiliary files.**

COUNTTYP.BAT

Complete Listing

```
@ECHO OFF
REM COUNTTYP.BAT - counts the number of times it has been executed
REM   with a particular command line parameter

REM ************************************************************************
REM  This is a self modifing batch file.
REM  Make a backup before running to prevent loss of time and effort.
REM ************************************************************************
SET datatype=none
IF NOT '%1'=='' SET datatype=%1

REM The following line will increment the count.
ECHO rem data - %datatype% >> COUNTTYP.BAT

IF NOT "%2" == "0" GOTO :skipinit
REM The following line will initialize the file.
FIND /I /V "data - %datatype%" < COUNTTYP.BAT > COUNTTYP.BAT
:skipinit

REM The following lines will store the count in the environment.
FIND /I /C "data - %datatype%" COUNTTYP.BAT > counttmp.bat
ECHO SET count=%%2 > --------.BAT
CALL COUNTTMP.BAT
DEL COUNTTMP.BAT
DEL --------.BAT

REM The following line will display the results.
ECHO Current count of type "%datatype%" is: %count%
SET datatype=

REM This is the start of the data.
```

Figure 2: **COUNTTYP.BAT expands on the concept of COUNT.BAT, counting any number of *different* types of data. It keeps a separate count for each data type.**

points will be lost when the file is reinitialized, causing the program to crash.

Eric Ellingson
Minneapolis, Minnesota

▶PC MAGAZINE: COUNT.BAT initially sets the environment variable *datatype* to the value 1. In the two FIND commands, it seeks the string "data - %datatype%", which COMMAND.COM expands at runtime to "data - 1". To understand the necessity for using this environment variable, imagine what would happen if you eliminated it and simply used the string "data - 1" throughout. The command that appends a new REM line to the

The problem was finding a way to let the batch file modify itself; I found that a trick used to find the count could also be used as a filter.

batch file would work just the same, but the command that counts the number of data lines will also find the three *program* lines that include that string. What's worse, the line that initializes the count by stripping out all the data lines will also strip out those three program lines. By using an environment variable, COUNT.BAT avoids this problem.

This approach is easily modified to handle multiple counts, as COUNTTYP.BAT (Figure 2) shows. This batch file sets the e-var *datatype* to the first command line parameter or to "none" if there is no first parameter. I added the /I switch to both FIND commands to make the data-type case insensitive. To reset a data type to 0, you call COUNTTYP.BAT, passing the data type as the first parameter and a 0 as the second. Try it! Enter COUNTTYP DOG, COUNTTYP CAT, or whatever you wish to count. The batch file keeps a separate count for each data type.

You can download these files from PC MagNet archived as COUNT.ZIP. □

Tutor

BY JEFF PROSISE

What's on Top? Windows' Z-Order Figures It Out

Have you ever wondered how Windows knows whether a given window lies in front of or behind other windows? The concept of front-to-back window ordering—which Windows refers to as *z-order*, in reference to an imaginary *z*-axis that runs perpendicular to the plane of the screen—is fundamental to any graphical operating system that supports overlapping windows. And yet it is a concept that few Windows users understand. The vast majority of everyday Windows users probably aren't even aware that a z-order exists.

What is the z-order, when is it used, and how does Windows keep a record of it internally? Are there exceptions to the z-order—that is, does Windows ever violate its own rules for displaying windows in front-to-back order? Is it possible to use this knowledge to make yourself a more proficient Windows user? You'll discover the answers to these and other questions as we take a look at this seldom-discussed aspect of Windows' internal operation.

Z-ORDER BASICS Let's put aside for a moment the question of how the z-order is stored and concentrate on the question of what it is and how it is used. First, it's obvious that Windows must keep some kind of record of each window's front-to-back position relative to all of the other windows. Think about it for a moment. If one window overlaps another, how does Windows know which one should receive the priority; that is, which one should be displayed on top of the other? And if two windows cover a common area, which one of them should receive mouse clicks?

The answer lies in the z-order. Windows that are higher in the z-order receive priority over windows that are lower in the z-order when it comes time to paint the screen or sort out mouse clicks. Imagine you numbered every window in the system from 1 to *n*, where *n* is the number of windows displayed. The higher the number, the higher the window's display priority and the closer it appears to the front of the screen; the lower the number, the lower the display priority and the farther back the window appears.

What is z-order and when is it used? Find the answers to these and other questions as we look at this seldom-discussed aspect of Windows' internal operation.

That's analogous to how the z-order works. When a window needs repainting, Windows sends it a WM_PAINT message. (The actual mechanism that Windows uses to create WM_PAINT messages is a study unto itself and is far different than what most people, even seasoned Windows programmers, imagine it to be. For more information, see Chapter 7 of Matt Pietrek's excellent book, *Windows Internals*, from Addison-Wesley.) Before sending the message, Windows formulates an update region for the window, defining which parts of the window can be painted and which parts can't. Painting is restricted to the update region. Areas of a window that are overlapped by windows higher in the z-order are excluded from the update region. Thus, a window that is higher in the z-order will always appear above windows that are lower.

Thinking of the z-order as a sequential numbering system is simplifying things a bit. Windows 3.1 actually enforces two independent sets of z-orders: one for *topmost* windows and another for nontopmost windows. The notion of topmost windows was introduced in Windows 3.1. Topmost windows always appear over nontopmost windows, even if a nontopmost window occupying the same area as a topmost window is active and the topmost window is not. That's how the Always on Top choice in the system menu of Windows 3.1's Clock program and similar features in other programs work. Within the subset of topmost windows, normal z-order rules apply. Therefore, if you have two topmost windows being displayed at once, one will always have priority over the other.

Windows also maintains separate z-orders for different levels of windows. Suppose that your Windows screen is currently showing three main application windows (or *top-level* windows—not to be confused with topmost), A, B, and C, and that each top-level window contains three child windows. These children could be push buttons, list boxes, other controls, or even document windows, but for this example, we'll just use three push-button windows. The ensuing window hierarchy is illustrated in Figure 1.

The desktop window—the window that appears behind all other windows and the one that you can attach wallpaper to—sits at the top of the hierarchy.

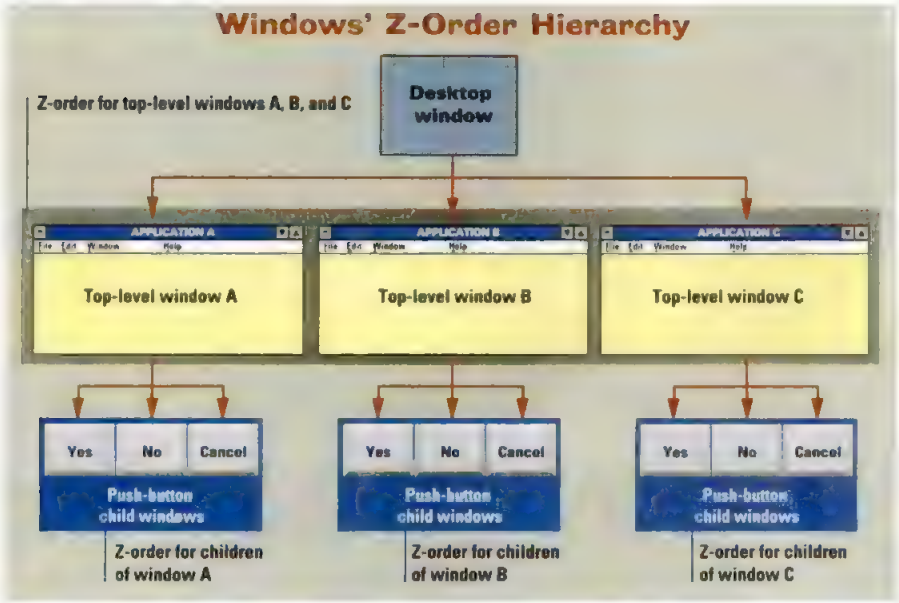


Figure 1: **Windows maintains several different z-orders to determine which windows should appear on top of others.**

Below it are the three top-level windows, whose relative display priorities are determined by their z-order. Within any one of these windows, a separate z-order determines the display priority of the child windows. The children's z-orders are independent of each other and of the z-order that affects top-level windows. If one top-level window has display priority over another top-level window, the first window's children have priority, too. Moreover, windows that fall lower in the hierarchy are displayed on top of their parent windows, which must, by definition, occur higher in the hierarchy. Therefore, the child windows in this illustration always appear on top of their parents. One by-product of this design is that the desktop window is never allowed to obscure other windows. This is fortunate, because if it could, you wouldn't be able to see the applications that you are running!

HOW WINDOWS STORES THE Z-ORDER

It's reasonable to guess that Windows might use data structures called WINDOWORDER or something like that to store z-order lists. But that's not the case (if only it were so simple!). The z-order is a conceptual way of thinking about display priorities; it doesn't have a direct analogue in the Windows internals. Instead, z-orders are derived from a system of undocumented linked lists that Windows sets up internally. A *linked list* is a way of ordering data in which one object in the list contains a pointer to the next object.

For each window that it creates, Windows creates a data structure containing important information about the window. Programmers refer to this data structure as the WND structure. Among other things, the WND structure holds the window handle of the window's parent, the window handle of the first child window belonging to the window, and the handle of its next sibling window, which forms part of a linked list of sibling windows. The three top-level windows shown in Figure 1 are siblings of one another. The push-button windows in each top-level window are also siblings of each other, but the push buttons belonging to window A are not siblings of the push buttons in window B. A window's position in the z-order is determined by its position in the linked list of sibling windows.

The z-order is derived from undocumented linked lists that Windows sets up internally.

Here's an example: Let's say that the FirstChild entry of the WND structure for the desktop window holds the handle of window B. Window B is now highest in the z-order applied to top-level windows. If the NextWindow entry of the WND structure for window B contains the window handle for window A, then A is next in the z-order. The NextWindow entry for window A holds the handle of the window C, so window C falls at the bottom of the z-order. If these three windows overlap each other, window B will appear on top, followed by window A, and finally by window C—assuming, of course, that A, B, and C are either all topmost or all nontopmost windows, so that no window is accorded special priority over its neighbors. And when Windows displays any one of these windows, it consults the corresponding WND structure's FirstChild entry to identify the push button that is highest in the child windows' z-order. After that, it traverses the linked list of child windows by consulting the child windows' NextWindow entries until the top-level window and all of the windows that it owns are displayed. It sounds like a complicated process, but in fact linked lists such as these are traditional and often-used ways of keeping track of program objects. One of the real beauties of this tracking system is that all windows are intrinsically linked together. Windows can start with any window in its internal window hierarchy and enumerate all the other windows in the system.

As an aside, you can see how creating lots of windows can eat up memory. In Windows 3.1, every WND structure consumes 60 bytes of memory. WND structures are stored in a 64K area of memory reserved by USER, one of the modules that forms the core of Windows. The amount of free space in this 64K region (known as a heap) is one determinant of the infamous *free system resources.* If your free system resources get too low, Windows will refuse to start additional applications even if there are still megabytes of memory free elsewhere in the system. Don't forget that every button, list box, combo box, and other control is itself a window, complete with a WND structure. The heap can certainly fill up very fast.

REQUIRED READING

Stay on the cutting edge. Subscribe to Ziff-Davis computer magazines.

PC MAGAZINE

Get the leading magazine for computer professionals. You can trust PC Magazine to give you the most timely and reliable PC product information available, 22 times a year — with comprehensive evaluations and bottom-line benchmark test results from PC LABS.

1 year (22 issues) for $29.97. **SAVE 54%!**
2 years (44 issues) for $49.97. **SAVE 62%!**
PLUS GET FREE SOFTWARE!

CALL 1-800-289-0429

WINDOWS SOURCES

It's the hot new source of power for Windows™ users. Every issue brings you details on the best new Windows-related products, emerging trends, the latest undocumented power tips and practical solutions to your computing problems.

1 year (12 issues) for $19.97. **SAVE 44%!**
2 years (24 issues) for $35.40. **SAVE 50%!**
PLUS GET FREE SOFTWARE!

CALL 1-800-365-3414

COMPUTER SHOPPER

America's premiere Computer Marketplace is filled with over 1,000 ads giving you the best deals on hardware, software, and accessories. You get instant access to over 500 vendors with the widest selection, highest quality — even overnight delivery!

1 year (12 issues) for $21.97. **SAVE 38%!**
2 years (24 issues) for $39.97 **SAVE 44%!**
PLUS GET A FREE GIFT!

CALL 1-800-274-6384

MACUSER

The #1 information resource for Macintosh professionals gives you hundreds of invaluable product reviews from MacUser Labs, time-saving tips and tutorials, and late-breaking news to help you stay on top of ever-changing Macintosh technology.

1 year (12 issues) for $19.97. **SAVE 44%!**
2 years (24 issues) for $35.40. **SAVE 50%!**
PLUS GET A FREE GIFT!

CALL 1-800-627-2247

PC/COMPUTING

PC/Computing delivers the solutions, strategies, and straightforward tips you need to plan, buy and work smarter with your PC at your home or office. Get all the systems information and productivity-enhancing ideas you need to succeed!

1 year (12 issues) for $14.97. **SAVE 58%!**
2 years (24 issues) for $26.97. **SAVE 62%!**
PLUS GET FREE SOFTWARE!

CALL 1-800-365-2770

Get the computing power of Ziff-Davis delivered! Subscribe today.

TMTOGGLE.C

Complete Listing

```
/*
 *  TMToggle toggles the topmost/non-topmost style of other windows.
 */

#include <windows.h>

long FAR PASCAL WndProc (HWND, WORD, WORD, LONG);

/*
 *  Function WinMain.
 */

int PASCAL WinMain (HINSTANCE hInstance, HINSTANCE hPrevInstance,
                    LPSTR lpszCmdLine, int nCmdShow)
{
    static char szAppName[] = "TMToggle";
    WNDCLASS wndclass;
    HWND hwnd;
    RECT rect;
    MSG msg;

    if (!hPrevInstance) {
        wndclass.style = 0;
        wndclass.lpfnWndProc = (WNDPROC) WndProc;
        wndclass.cbClsExtra = 0;
        wndclass.cbWndExtra = 0;
        wndclass.hInstance = hInstance;
        wndclass.hIcon = LoadIcon (NULL, IDI_APPLICATION);
        wndclass.hCursor = LoadCursor (NULL, IDC_ARROW);
        wndclass.hbrBackground = COLOR_WINDOW + 1;
        wndclass.lpszMenuName = NULL;
        wndclass.lpszClassName = szAppName;

        RegisterClass (&wndclass);
    }

    SetRect (&rect, 0, 0, 144, 88);
    AdjustWindowRect (&rect, WS_OVERLAPPEDWINDOW, FALSE);

    hwnd = CreateWindow (szAppName, szAppName, WS_OVERLAPPEDWINDOW,
        CW_USEDEFAULT, CW_USEDEFAULT, rect.right - rect.left, rect.bottom -
        rect.top, HWND_DESKTOP, NULL, hInstance, NULL);

    ShowWindow (hwnd, nCmdShow);
    UpdateWindow (hwnd);

    while (GetMessage (&msg, NULL, 0, 0))
        DispatchMessage (&msg);

    return msg.wParam;
}

/*
 *  WndProc processes messages to the TMToggle window.
 */

long FAR PASCAL WndProc (HWND hwnd, WORD message, WORD wParam, LONG lParam)
{
    POINT point;
    static nAction;
    static BOOL bSearching = FALSE;

    switch (message) {

    case WM_CREATE:
        CreateWindow ("button", "Topmost", WS_CHILD | WS_VISIBLE, 0, 0,
            128, 32, hwnd, 100, ((LPCREATESTRUCT) lParam)->hInstance, NULL);
        CreateWindow ("button", "Non-Topmost", WS_CHILD | WS_VISIBLE, 0, 48,
            128, 32, hwnd, 101, ((LPCREATESTRUCT) lParam)->hInstance, NULL);
        return 0;

    case WM_COMMAND:
        if ((wParam == 100) || (wParam == 101)) {
            ShowWindow (hwnd, SW_MINIMIZE);
            bSearching = TRUE;
            nAction = wParam - 100;
            SetCapture (hwnd);
            return 0;
        }
        break;

    case WM_LBUTTONDOWN:
        if (bSearching) {
            bSearching = FALSE;
            ReleaseCapture ();

            point.x = (int) LOWORD (lParam);
            point.y = (int) HIWORD (lParam);
            ClientToScreen (hwnd, &point);

            SetWindowPos (WindowFromPoint (point), nAction ? HWND_NOTOPMOST :
                HWND_TOPMOST, 0, 0, 0, 0, SWP_NOMOVE | SWP_NOSIZE);
            return 0;
        }
        break;
    }
    return DefWindowProc (hwnd, message, wParam, lParam);
}
```

Figure 2: **This C Windows program essentially gives you an always-on-top option for any window on your desktop and lets you reverse your choices, too.**

CHANGING THE Z-ORDER It's easy to change the z-order. When you click an inactive window to make it active, Windows brings that window to the top of the z-order. Quite a bit of shuffling takes place in the background in order for Windows to update the z-order pertaining to windows at that level in the hierarchy and to repaint the screen. Say, for example, that the z-order is A, B, C, D. You click on C, and the new order is C, A, B, D. C pointed to D before; now it points to A. Likewise, B pointed to C before, and now it points to D. The z-order can also be changed programmatically with functions such as BringWindowToTop, SetWindowPos, and EndDeferWindowPos.

One thing Windows won't let you do, however, is change the style bit in a WND structure that determines whether the corresponding window is topmost or nontopmost. That's up to the program that created the window. Some programs offer an always-on-top option, and some do not. Wouldn't it be useful if you could decide whether a window should be topmost or nontopmost, so you could force certain programs—say, a calculator program that lacks an always-on-top feature—to display on top of Microsoft Word for Windows or Excel, even when inactive?

It's possible with the short utility whose C source-code listing is shown in Figure 2. (The other files required to compile the executable are available in the Tutor Library of PC MagNet's Utilities/Tips Forum archived as TMTOGG.ZIP.) The program, which I christened TMToggle for topmost toggle, is no work of art; I designed it for brevity rather than bells and whistles. But it does its job well. (For somewhat more bells and whistles, you can get *PC Magazine*'s TOTOP utility, in PC MagNet's Utilities Library.) To convert a nontopmost window into a topmost window, click TMToggle's Topmost button, and then click the left mouse button over the window that you wish to make a topmost window. That window should now display over nontopmost windows, even when it's inactive. To make the window nontopmost again, click TMToggle's Non-Topmost button and click over the window again. It's that simple. When you click on a window in order to make it topmost or nontopmost, be sure to click in an area of the window that is not covered by a child window. The title bar is a good, safe place to click. If you click over a child window, neither it nor its owner will be converted. TMToggle requires Windows 3.1 or higher, because earlier versions did not support topmost windows. Enjoy!

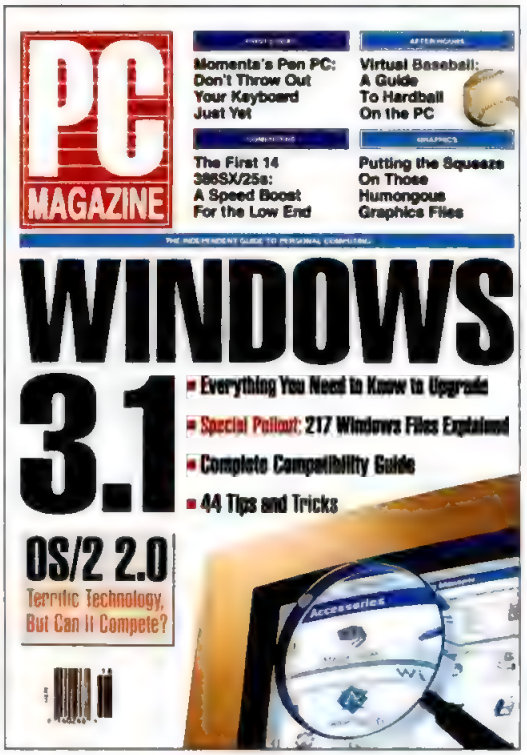
ASK THE TUTOR If there is a hardware or software topic you would like to see explained in the Tutor column, please send it to Tutor, *PC Magazine,* One Park Ave., New York, NY 10016-5802; or you can post it in the Tutor section of PC MagNet's Utilities/Tips Forum. □

THINK OF IT AS SOFTWARE FOR YOUR BRAIN.

PC Magazine gets you up and running when it comes to taking command of your PC environment.

Every issue provides in-depth reviews…comprehensive evaluations…news about emerging trends and new technologies…buying tips…and a whole lot more.

And there's a new release 22 times a year to give you the most reliable, most complete, most up-to-date facts on computers and computing.



SAVE UP TO 62% AND GET FREE SOFTWARE!

Sign up for one year, save 54% off the newsstand price, and get 22 issues for just $29.97. Or, subscribe for two years, save 62%, and get 44 issues for just $49.97.

Plus, your paid subscription gets you *PC Magazine*'s "Utilities Disk Library" on 3 disks — yours FREE! This hands-on PC tool contains 104 ultra-powerful utilities to make your system work better and faster.

Subscribe now to get your free software bonus.
In the U.S. call 1-800-289-0429

Outside the U.S. write to PC Magazine International
P.O. Box 115 • GPO • Limerick, Ireland

Please add $32.00 per year for postage outside the U.S.

FOR THOSE HARD CHOICES.

Negotiating today's crowded hardware scene isn't easy. That's why *PC Magazine* and John C. Dvorak have teamed up to produce *PC Magazine 1994 Computer Buyer's Guide.* It's your one-stop source for unbiased analyses and easy-to-read comparison charts for hundreds of PCs, monitors, printers, input devices, and modems, all benchmark-tested in the world's most modern computer research facility.

Combining the latest laboratory results from *PC Magazine* with Dvorak's no-holds-barred commentary, *PC Magazine 1994 Computer Buyer's Guide* is an indispensable shopper's companion that will save you money and help you find the hardware that meets your computing needs.

AVAILABLE AT ALL FINE BOOKSTORES
OR BY CALLING 1-800-688-0448 EXT. 8171

ZIFF-DAVIS ZD PRESS

©1993 Ziff-Davis Press

Extending Your Apps

BY GUY J. GALLO

Distributing Word For Windows Macros

The WordBasic programming language makes Word for Windows one of the most flexible and easily extended word processors on the market today. The possibilities for customization are limited only by the imagination and tenacity of the user or programmer. However, this flexibility can lead to enormous headaches when it comes to sharing solutions based on macros, particularly in corporate or network settings. After creating a useful macro, the question inevitably arises: "How can I install this macro on the machine of my partner/friend/client?" The answer to this question becomes increasingly valuable as the number of machines you want to load the macro on increases.

We all agree that the manual method is cumbersome. For example, to move a single macro into another user's NORMAL.DOT file, you have to physically move the template containing the new macro to the destination machine, open the template, open the macro, copy it to the Clipboard, create a blank global macro, paste the macro, and save all changes. You get the idea of how time consuming and tedious this can be.

This month's Extending Your Apps column describes a Word for Windows template that makes it easy to copy any number of macros to any number of destination templates. It might be used by individuals wishing to share their favorite solutions with an associate. Consultants and MIS administrators will find it useful to bring all computers up to date quickly when a necessary macro is changed or added to a company-wide system.

You can get a copy of the WinWord files described here by downloading the file NEWMAC.ZIP from *PC Magazine*'s Programming Forum on PC MagNet. If you prefer, you can request the files on disk. Look for details in the sidebar "Guide to Our Utilities & How to Get Them," which appears in the Utilities column.

This article assumes that you have an intermediate knowledge of the WordBasic programming language. The NEWMAC.DOT template was designed as a tool for developers—that is, for people creating and distributing the macro. The user at the other end of the copy process—the recipient—doesn't need to understand WordBasic or templates. Once you set up the template, the end user only has to click a single button, and the installation proceeds without further intervention.

This month's column describes a Word for Windows template that makes it easy to copy any number of macros to any number of destination templates.

INSTALLING NEWMAC.DOT It's simple: Copy NEWMAC.DOT to your Word for Windows template directory. In WinWord 6.0, the default template directory is named \WINWORD\TEMPLATE. The template directory is often referred to as your DOT-Path. Once NEWMAC.DOT is in your template directory, creating a vehicle for transporting macros to another machine is a three-step process. First, create a new template based on NEWMAC.DOT. Next, copy the macros to be distributed into the new template. Finally, run a macro to tell the vehicle how to install the macros on the destination machine. The NEWMAC.DOT template consists of three macros:

- AutoOpen executes when the end user opens the vehicle. The default version of this macro simply maximizes Word for Windows and the vehicle document. AutoOpen maximizes WinWord for much the same reason most applications take over the entire Windows desktop when they install: to tell the end user something about the macro being installed. You might want to take advantage of this and make sure that end users see all the instructions and documentation.
- SetupVehicle is the heart of the developer end of NEWMAC.DOT. The macro developer uses SetupVehicle to specify where to install the macro on the user's machine and what optional menu item or shortcut key combination to assign to the newly installed macro.
- InstallMacros is the part of NEWMAC.DOT that actually copies the new macros to the destination machine.

CREATING THE DISTRIBUTION VEHICLE Creating a macro distribution vehicle depends upon a little-used, very neat WinWord trick: You can disguise a template as a document. You can create a template and save it with a .DOC extension, and when you're done, you have a document that can carry macros. You need to copy only a single file to the destination machine, and the user simply opens a document and follows whatever instructions the developer has included. If this sounds confusing, let's clear it up with a simple example. When you're done with these instructions, you'll have a file named HWORLD

.DOC (also included in the NEWMAC.ZIP file on PC MagNet).

First, create a new template based on NEWMAC.DOT. Click on File¦New and then highlight NEWMAC.DOT. Select Template in the New group and click on OK. It's important to click on the Template option in the New group. If you just create a document (rather than a template) based on NEWMAC.DOT, you'll miss the whole point of this story.

Next, save the new template with a standard filename. Note that when Word for Windows sees you want to create a template, it assumes you wish to save the template in the template directory. While this isn't a requirement, in order to save the vehicle elsewhere, the destination directory must already exist (since WinWord won't create a new directory from the Save As dialog box), and you must type in the full pathname. For instance, I saved the example vehicle as D:\WINWORD\HWORLD.DOC.

COPYING AND CREATING THE MACRO In many cases, you'll want to distribute a macro that already exists in one of your templates. In WinWord 6.0, use the Organizer command to copy an existing macro into the distribution vehicle. For this example, let's create a macro directly within the vehicle named HWORLD .DOC.

With the HWORLD template open, create a new macro named ImHere by clicking on Tools¦Macro. Be sure to create the new macro only in the HWORLD template by selecting "Hworld.doc (template)" in the Macros Available In dropdown list on the macro dialog box. While this example macro is simplistic, it serves well to demonstrate how to set up the macro distribution vehicle:

```
Sub Main
MsgBox "Hello World!", "Neat"
End Sub
```

Close the macro pane and save changes to the macro. Now comes the fun part.

RUNNING SETUPVEHICLE The SetupVehicle dialog box shown in Figure 1 lets you specify the macro to copy, the destination template, the name of the macro after the copy, whether to place the macro on a menu, the menu text, and an optional key assignment. As the macro developer, you run the SetupVehicle macro by either double-clicking on the SetupVehicle macro from the Tools¦Macro dialog box or by pressing Alt-Down Arrow key. I haven't assigned the SetupVehicle macro to a menu or to a toolbar icon in order to avoid confusion when the vehicle is passed to an end user.

By default, the destination template for the new macro installation on the user's machine is NORMAL.DOT. But you can change this to any template already on the destination machine. The installation process looks for the specified template in the user's DOT-Path. However, you can also specify a full pathname when entering the destination template. The specified template must already exist on the recipient's machine. For this example, leave NORMAL.DOT as the destination. The Name After Copy defaults to the same as the macro name in the vehicle, but you can enter a different name in this edit box.

The Key Code edit box is the most complicated (and potentially most dangerous) aspect of SetupVehicle. This edit box lets you assign the macro to a key combination after the macro is installed on the destination machine. The danger is obvious: It's possible to overwrite an existing key assignment if you're not careful. Adding to the complexity is the way each key must be identified. Each key on the keyboard has a numeric identifier. Each of the three possible modifier keys (Ctrl, Shift, and Alt) also has a numeric identifier (256, 512, and 1024, respectively). By adding the value of the base key to the value of the modifiers you get the key code. For example, to assign ImHere to Ctrl-Shift-G, you would add 256 + 512 + 71, and place 839 in the Key Code box (see the sidebar "A Note on Key Codes" for more information). Remember, the install procedure is not smart enough to know if you are overwriting an existing key assignment on the recipient's machine. Therefore, use the Key Code function with care.

The Place On Menu dropdown list contains nine items: the default "None" and the eight Word for Windows top-level menus. Select the View menu from the list. Note that SetupVehicle immediately proposes the name of the macro, preceded by an ampersand and followed by an ellipsis, as the text to place on the submenu. The ampersand marks the speed key character—the character displayed with an underline on the submenu. The ellipsis is a Windows convention that indicates the menu item will display a dialog box. You can accept the default &ImHere. . . as the menu text or use a better description for the macro's function, such as &Greetings. . .

If the Divider Before check box is checked, InstallMacros will insert a divider on the selected menu before placing the Menu Text on the menu. If "None" is selected in the Place On Menu list, this option has no effect. Press Alt-B to check the Divider Before check box.

The last option on the SetupVehicle dialog box is the Auto Save check box. If this option is checked, then all changes to the destination template will be automatically saved. If this option is not checked, the user will be asked to confirm all changes.

After you've specified all the options, press Alt-A to add the installation instructions to the vehicle. You'll see an item appear in the Current Installation Information list box. SetupVehicle created a glossary entry and stored it in your vehicle (HWORLD.DOC, in this case). The glossary name is a combination of the destination template and the macro name separated by a colon: DestName:

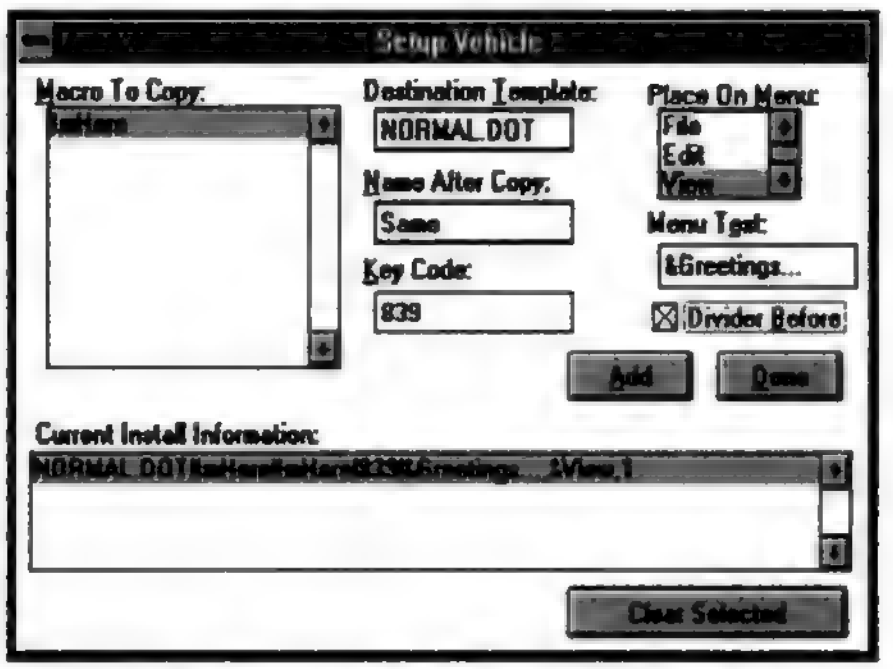


Figure 1: **The SetupVehicle dialog box lets the developer specify where and how the macro will be copied to the destination machine. Developers can even assign key combinations on the recipient's machine from here.**

A Note on Key Codes

A listing of the key codes for the most frequently used keys is available in the Word for Windows macro reference, *Using WordBasic* (pages 311 through 314), and in the WordBasic section of the on-line Help file. The easiest way to display this list is to enter any macro pane, type "ToolsCustomizeKeyboard", and press F1.

However, the list provided by Microsoft is not complete or systematic. For example, the standard list includes PgUp, PgDn, Home, and End keys. It skips Left, Up, Right, and Down Arrow keys (key codes 37 to 40). The direction keys will not accept three of the possible modifier combinations: Ctrl, Shift, and Ctrl-Shift. However, a combination such as Alt-Right Arrow or Alt-Shift-PgUp is possible. In the NEWMAC.DOT template, I've assigned SetupVehicle to Alt-Down by using the key code 1064 (40 + 1,024).

Another group of key codes not included in the standard list are the following punctuation marks:

Key	Code
Semicolon	186
Equal sign	187
Comma	188
Dash	189
Period	190
Slash	191
Grave accent	192
Left Bracket	219
Backslash	220
Right Bracket	221
Apostrophe	222

The placement of these keys can vary from keyboard to keyboard, so it makes some sense to omit them from any standard list. You can find a complete table of available key codes, including notations of standard Word for Windows assignments, in my book *Take Word for Windows to the Edge* (Ziff Davis Press, 1993).

It's possible that the proposed key code will conflict with an assignment already in place on the destination machine. If you're distributing macros to several users within a company, I suggest that you establish a convention for all distributed macros. For example, Word for Windows uses Ctrl and Ctrl-Shift key combinations both for internal commands and as the range of possible key combinations when a user assigns a macro using ToolsCustomizeKeyboard. SetupVehicle lets you use Alt-Ctrl key combinations, and it's unlikely that an Alt-Ctrl assignment will conflict with a user key assignment, because no internal Word for Windows command uses Alt-Ctrl combinations.

MacroName. In our example, SetupVehicle created a glossary named NORMAL.DOT:ImHere that points to a string built from the seven options entered in the SetupVehicle dialog box. The glossary text follows the syntax:

```
DestTemplate|SrcName|DestName|
KeyCode|MenuText,Menu,Divider
```

Our example creates the string:

```
NORMAL.DOT|ImHere|ImHere|839|
&Greetings. . .,&View,1
```

This string is used by the macro named InstallMacro, which the recipient of your vehicle runs to start the macro installation. To see what it does, press Alt-D to remove the SetupVehicle dialog box and double-click on the macro button at the top of HWORLD.DOC. If you examine the list of global macros, you'll see that ImHere is now in your NORMAL.DOT. If you pull down the View menu, you'll see a new menu item. Press Ctrl-Shift-G to activate the new macro.

There's only one rule you must follow when creating distribution vehicles: You can't have any glossary entries other than those generated by SetupVehicle. Since this is a single function template, it's unlikely this would become a problem.

That's it! Once set up and saved, the HWORLD.DOC vehicle contains both the macros that you want to install and the installation instructions for the recipient. To distribute macros to colleagues, just give them a copy of this disguised template and instruct them to open it.

CHANGING WHAT THE RECIPIENT SEES By default, the AutoOpen macro contained in NEWMAC.DOT (and in any vehicle created using it) simply maximizes the Word for Windows application and the vehicle document. In order to begin the copy process, the end user must double-click on the macro button. You may wish to automate the installation procedure even further. For example, you could have the AutoOpen macro execute InstallMacros:

```
Sub MAIN
ToolsMacro "UpdateMacros",
 .Run, .Show = 2
End Sub
```

You could even have the AutoOpen macro execute InstallMacros and then close the installation vehicle:

```
Sub MAIN
ToolsMacro "UpdateMacros",
 .Run, .Show = 2
DocClose
End Sub
```

Finally, you could also display a message box to prompt the installation rather than require clicking on the macro button. The following would display a yes or no message box:

```
Sub MAIN
ViewFieldCodes 0
'Msg$ = "Do you wish to proceed
 with installation of ImHere?"
'If MsgBox(msg$, 36) Then
 ToolsMacro "InstallMacros",
 .Run, .Show = 2
End Sub
```

ENCRYPTING MACROS WinWord lets you encrypt macros so users can't edit them. This is done using the WordBasic command MacroCopy. The following macro will encrypt the ImHere macro in HWORLD.DOC.

```
Sub MAIN
FromTemplate$ = "D:\WINWORD
\HWORLD.DOC"
```

VB Power

ISBN: 1-56276-073-4
Price: $34.95

This innovative guide by Dan Appleman turns Visual Basic programmers into power users by illuminating the tools of the Windows Application Program Interface (API). Includes a time-saving disk that contains source code from the examples in the text, plus a specially designed dynamic link library (DLL).

Available at fine bookstores, or call 1-800-688-0448 ext. 8448

ZIFF-DAVIS ZD PRESS

© 1993 Ziff-Davis Press


```
FromMacro$ = "ImHere"
ToTemplate$ = "D:\WINWORD
\HWORLD.DOC"
ToMacro$ ="ImHere"
Encrypt = 1
MacroCopy FromTemplate$ +
 ":"+FromMacro$, ToTemplate$ +
 ":"+ToMacro$, Encrypt
End Sub
```

Note that since HWORLD.DOC is not in the DOT-Path, I've specified the full pathname. Also, when using this macro to copy or encrypt a macro, both the destination and the source template must be open in the current Word for Windows workspace. The NORMAL .DOT template is always open, but any other template must be open either directly or because a document based upon that template is open.

If a macro is unencrypted in the vehicle, it will be copied as unencrypted. Similarly, an encrypted macro will be copied encrypted. If you want InstallMacros to always encrypt a macro during the installation process, locate the following line in InstallMacros:

```
MacroCopy From$, To$
```

and change it to:

```
MacroCopy From$, To$, 1
```

ADDING OTHER MACROS TO NEWMAC.DOT You may have noticed that SetupVehicle does not display itself, AutoOpen, and InstallMacros in the list of macros available for copying. SetupVehicle excludes itself (and the other standard NEWMAC.DOT macros) from the list with the following two lines, found at the top of the macro:

```
ExcludeString$ = "UPDATEMACROS,
SETUPVEHICLE,AUTOOPEN,"
ExcludeCount = 3
```

I bring this to your attention in case you want to include other utility macros in your copy of NEWMAC.DOT. For instance, you could include the above encrypting macro in NEWMAC.DOT and all vehicles based on it. To do so, name it EncryptMacro and edit SetupVehicle so these first two lines read as follows:

```
ExcludeString$ ="UPDATEMACROS,
SETUPVEHICLE,AUTOOPEN,ENCRYPTMACRO,"
ExcludeCount = 4
```

Note that the macro names are capitalized and that the string ends with a comma. Also, note that the ExcludeCount has been increased from 3 to 4.

FINISHING TOUCHES The purpose of NEWMAC.DOT is to create a self-contained vehicle for distributing macros from one machine to another. Once you've created a new macro, a vehicle for that macro, and generated installation instructions, you can delete SetupVehicle from the vehicle template. It's no longer necessary, and removing it will decrease the file size (which might be important if you're distributing the macro vehicle via modem).

NEWMAC.DOT creates a self-contained vehicle for distributing macros.

The example vehicle, HWORLD .DOC, is shipped with SetupVehicle still present. If you have followed the steps to set up ImHere, you can now delete the SetupVehicle macro using WinWord 6.0's Organizer feature or by selecting SetupVehicle in the Macros dialog box and pressing Alt-D. Your macro vehicle is now ready to distribute to end users.

This utility best illustrates the incredible power of an undocumented WinWord trick. When you create a template and save it with a .DOC extension, you're creating the best of both worlds: Anything that can go into a document can go into a disguised template. The difference between the two is that the disguised template can contain document-specific templates and glossaries. NEWMAC.DOT is just one good example of what you can do with this neat trick. □

GUY GALLO HAS WRITTEN TWO BOOKS ON WORD FOR WINDOWS: *USING WORDBASIC* (WITH WEXTECH SYSTEMS) AND *TAKE WORD FOR WINDOWS TO THE EDGE* (ZIFF-DAVIS PRESS).

Toolkits

BY REX CONN

Programming for OS/2 with Gpf

Gpf stands for "GUI Programming Facility," not the dreaded Windows "General Protection Fault"! Gpf, Version 2.1, is a 32-bit, OS/2-hosted GUI development tool that creates CUA 1991–compliant C or C++ applications for OS/2 1.3 or later or even for Windows 3.*x*. Though pricey at $1,295, Gpf is easy to learn and use, and it produces small, fast code, which doesn't require DLLs or royalty fees.

Though you can develop Windows programs with Gpf, that is not its main target platform, and support for Windows is minimal. Aspects of the Windows environment that are shared with Presentation Manager are supported; Windows-specific features are not supported. If you have IBM's $149 CUA Control Library/2 (CCL/2), you can use OS/2 2.*x* controls such as containers, notebooks, sliders, and spin buttons in your OS/2 1.3 and Windows 3.*x* programs. Windows support is new with Gpf 2.1. Also new are the ability to generate DLLs and to create context-sensitive pop-up menus.

CREATING THE INTERFACE Gpf handles the creation of the entire user interface, including not only the windows, menus, dialog boxes, and controls but the on-line help and navigation code (the code that determines what actions are taken when you click on "About", for example). This leaves you free to concentrate on the custom-application logic.

If you have OS/2 Database Manager or IBM DB2/2 installed, Gpf will detect it and offer features to aid in the writing of SQL front ends. Gpf can list and read IBM SQL databases and decompose them into their component tables. You can associate database fields with your form's editable fields, list boxes, combo boxes, and containers so that the data is loaded and displayed when you run your application. There are no built-in controls such as "next" or "previous" for moving about within the databases, however. You must write this yourself.

To create an application in Gpf, specify the compiler you'll be using and whether you'll be using the OS/2 Database Manager. Then start creating windows and dialog boxes and placing the controls, icons, and bitmaps on your form. Gpf stores the program definition in an .ORC file. To make changes to your interface, simply reload and edit the .ORC file.

You can add your own source code through the creation of User Function Objects. Simple routines (up to 4K) can be entered directly into an edit box in the User Function dialog box. More complex code can be called by entering a function call into the User Interface Object.

Gpf provides two ways to test the interface during creation: test mode and the Toolkit Animator. Test mode runs from the Gpf editor and allows you to test only the user controls, not the navigation code. The Toolkit Animator runs the application as if it were already compiled and in addition to testing controls also lets you test navigation code and SQL database links. The Toolkit Animator also provides a trace window for viewing Presentation Manager messages and actions.

When the user interface is complete, Gpf generates the C or C++ source code and all of the necessary support files and calls your compiler to build the executable file. To build the same application for an alternative platform, simply select a different compiler and generate the code again.

NEEDED ENHANCEMENTS Gpf Systems also offers GpfTools, an invaluable add-on to Gpf that lets you browse and document your .ORC files. It will generate ASCII or .INF (OS/2 help) files from all or part of an .ORC file. (The .INF files require the IBM IPF (Information Presentation Facility) compiler, which is not included with Gpf.) The ability to generate .INF files lets you use hyperlinks to explore the help panels and the code associated with User Interface Objects. The hyperlinks are created automatically by Gpf.

In addition, you can use GpfTools to build a dictionary of User Interface Objects you've created (controls, notebook pages, user functions, windows, and so on), which you can then drag and drop into new applications.

As good as Gpf 2.1 is, there are still a few things to wish for. For example, Gpf does not have any built-in custom controls (nonstandard but commonly used interface objects, such as toolbars). There is also no support for the Workplace Shell SOM (System Object Module) or class libraries like ICLUI (IBM C++ Language User Interface). More extensive Windows support, including Win32, would be valuable for developers who have to support multiple platforms. And lastly, the price, while not a hindrance for large organizations, will scare away the small shops.

User-interface code takes up a large percentage of GUI programs, so a tool that generates this code for you can mean a substantial savings of time and effort. Gpf worked flawlessly during testing, and produced small, fast, error-free executables. If you're doing serious PM development and not using Gpf, you're working too hard.

• Gpf, Version 2.1

List price: *$1,295; with GpfTools, $1,440.*
Requires: *OS/2 2.0 or later, 8MB RAM, 8MB hard disk space, C or C++ compiler.*
Gpf Systems Inc., P.O. Box 414, 30 Falls Rd., Moodus, CT 06469-0414; 800-831-0017, 203-873-3300; fax, 203-873-3302; BBS, 203-873-3304.
Circle 522 on reader service card

Environments

BY CHARLES PETZOLD

The Windows NT Path Functions

There are paths to riches, paths of glory, paths of righteousness, paths of laudable pursuit, the beaten path, the primrose path, the long brown path, tornado paths, career paths, bridle paths, and directory paths.

And then there is the graphics path, which (unlike some of the others) is not quite yet a household concept.

I first encountered graphics paths in PostScript where, I believe, they originated. You really can't draw very much in PostScript without using paths. Indeed, the first graphics programming example in *The PostScript Language Tutorial and Cookbook* shows how to draw a 5-inch vertical line on a page using paths:

```
newpath
   144 72 moveto
   144 432 lineto
stroke
showpage
```

At first, this seems like an inordinate amount of overhead to draw a simple line. Why are the `newpath` and `stroke` keywords necessary? Shouldn't it be possible to draw the line by simply indicating its beginning and ending coordinates?

Well, yes, it *should* be possible, and both the Windows NT Graphics Device Interface (GDI) and the OS/2 Graphics Programming Interface (GPI) let you do just that. But both these graphics systems also support paths, and—as we saw in the last issue—paths provide powerful facilities that are not available otherwise. For example, you can draw a connected series of different types of straight lines and curves and give the connections specified line-join styles—rounded, beveled, or mitered. The graphics system would be unable to tell that these lines should be connected unless they were grouped in a path.

You can also use paths to define areas for filling with a color or pattern. The boundaries of these areas can consist of a connected series of straight lines, arcs, or Bezier splines. The area can also be converted to a GDI region or selected for clipping.

PATH FUNCTIONS Windows NT has nine functions specifically for creating and rendering paths. These are shown in Figure 1 in the order you'd call them in a program. As I illustrated in the last issue, you call

```
BeginPath (hdc) ;
```

to initiate a path bracket. Then you can call line-drawing functions and possibly CloseFigure. The lines drawn within the path bracket are not rendered on the display. Instead, the line definitions accumulate in GDI's internal bracket with a call to

```
EndPath (hdc) ;
```

You can then call WidenPath and one of the five functions shown at the very bottom of Figure 1. Each of these five functions destroys the path definition, thus freeing any memory that has been allocated for it.

Between the calls to BeginPath and EndPath, line-drawing functions are called. GDI defines 21 such functions used to create a path definition.

INSIDE THE PATH BRACKET Between the calls to BeginPath and EndPath, line-drawing functions are called. GDI defines 21 such functions used to create a path definition. These are shown in Figure 2. As I discussed in the last issue, a path comprises one or more subpaths. Each subpath is a series of connected straight lines and curves. To indicate to GDI that a series of lines is connected, you must draw these lines only with functions that use and set the current position. These are shown in the column labeled "CP functions" in Figure 2.

Generally, you begin a subpath with MoveToEx and then call any of the next five functions listed in the "CP functions" column—in any order. You can end the subpath with a call to CloseFigure, which adds a straight line to the path, from the current position to the beginning of the subpath. Even if you don't change the current position after calling CloseFigure, any subsequent function call begins a new subpath.

You can also end a subpath (and begin a new one) with another call to MoveToEx or any other function that implicitly changes the physical location of the current position, such as SetMapMode. Or you can end a subpath and create a new one by calling any of the functions shown in the "non-CP functions" columns in Figure 2.

The PolyDraw function is a special case. This function can perform the equivalent of MoveToEx, PolylineTo, PolyBezierTo, and CloseFigure. Thus, it can create one or more subpaths.

The "non-CP functions" column in Figure 2 lists functions that do not use or set the current position. Calling those functions will add one or more subpaths to the path definition. Most of them add only one subpath, but PolyPolyline, PolyPolygon, TextOut, and ExtTextOut can define more then one subpath.

A subpath can be either open or closed. Even if the last line of a subpath ends at the same point as the starting po-

sition of the subpath, it is not necessarily closed. Using the functions shown in the first column of Figure 2, you must end the subpath definition with a call to CloseFigure to make it closed.

The functions in the "open" column always create one or more open subpaths. The functions in the "closed" column always create one or more closed subpaths.

The TextOut and ExtTextOut functions require more explanation: As you know, Windows NT supports raster (also called bitmap) fonts, vector (or plotter) fonts, and TrueType outline fonts. If a raster font is selected into the device context at the time of the TextOut or ExtTextOut call, nothing is added to the path definition and the characters are not rendered on the display. If a vector font is selected, the strokes of the characters become one or more open or closed subpaths, depending on the character.

If a TrueType font has been selected into the device context, the character outlines become part of the path. Each character is stored as one or more closed subpaths. For example, an *H* is stored as one closed subpath, which is the outline of the character. An *O* is stored as two closed subpaths—the outer circle and the inner circle. Similarly, an *i* is stored as two closed subpaths because the dot is separate. In many fonts, the ampersand (&) is stored as three subpaths.

I mentioned earlier that you can only continue a subpath with functions that use and set the current position. Although you can cause the TextOut and ExtTextOut functions to use and set the current position by calling SetTextAlign with the TA_UPDATECP parameter, the TextOut and ExtTextOut functions do *not* continue a subpath. The current position instead refers to the points where the text string begins and ends.

If you use TextOut and ExtTextOut in a path (as I'll demonstrate in future columns), you'll very likely want to call SetBkMode with the TRANSPARENT option before calling the text-output functions. Otherwise, the character-box rectangle also becomes part of the path definition.

You can call other GDI functions in a path bracket and nothing bad will happen. Sometimes they will have no effect—such as TextOut when a raster font has been selected in the device context—but more often they will simply be rendered on the display without becoming part of the path definition.

RENDERING THE PATH After ending the path definition with a call to EndPath, you can call WidenPath (which I'll describe in the next issue) and then one of the functions shown at the bottom of Figure 1. The first is

```
StrokePath (hdc) ;
```

This function renders the path by stroking it with the pen currently selected in the device context. You can create this pen using CreatePen or ExtCreatePen. In most cases, you'll be using ExtCreatePen to create a geometrically thick pen with specified line ends and joins. Otherwise, there's not much reason to use paths and the StrokePath function.

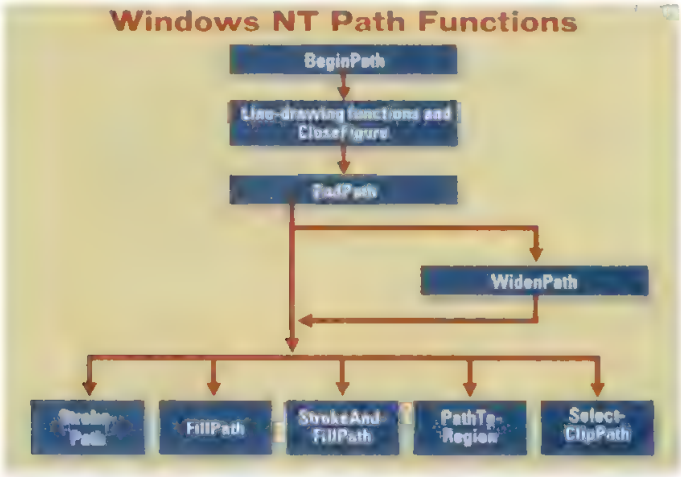


Figure 1: **The Windows NT path functions, in the order you call them in a program.**

Windows NT Line-Drawing Functions

CP functions	Non-CP functions	
MoveToEx	TextOut	
LineTo	ExtTextOut	
PolylineTo		
ArcTo	**Open**	**Closed**
AngleArc	Polyline	Rectangle
PolyBezierTo	PolyPolyline	RoundRect
PolyDraw Arc		Ellipse
CloseFigure	PolyBezier	Chord
		Pie
		Polygon
		PolyPolygon

Figure 2: **The 21 line-drawing functions used to create a path definition. (Note that "CP" in the column titles stands for current position.)**

If you've worked with paths under the OS/2 Presentation Manager, you may be aware that GPI has a GpiOutlinePath function as well as GpiStrokePath. In OS/2, the GpiStrokePath function renders the path as a geometrically thick line, and GpiOutlinePath renders it as a cosmetically thick line. In Windows NT, whether the pen has a geometric or cosmetic width depends on the parameters to ExtCreatePen.

You can call the ExtCreatePen function before a path bracket, within a path bracket, or after ending the path bracket. However, the appearance of the line will depend solely on the pen selected in the device context at the time the path is stroked. Because the pen width is specified in logical coordinates and affected by transforms, the appearance of the pen also depends on the transforms in effect at the time the path is stroked. You cannot create a path in which some lines are one width and some lines another.

You can also fill the interior of a path by calling

```
FillPath (hdc) ;
```

In this case, all open subpaths are automatically closed with straight lines that connect the beginnings and ends of the subpaths. The interiors are filled with the current brush selected in the device context.

If you want to stroke the path as well as fill the interior (as is often the case), you can do it with one call to

```
StrokeAndFillPath (hdc) ;
```

PATHOPS.C

Complete Listing

```
/*ÐÐÐ
```

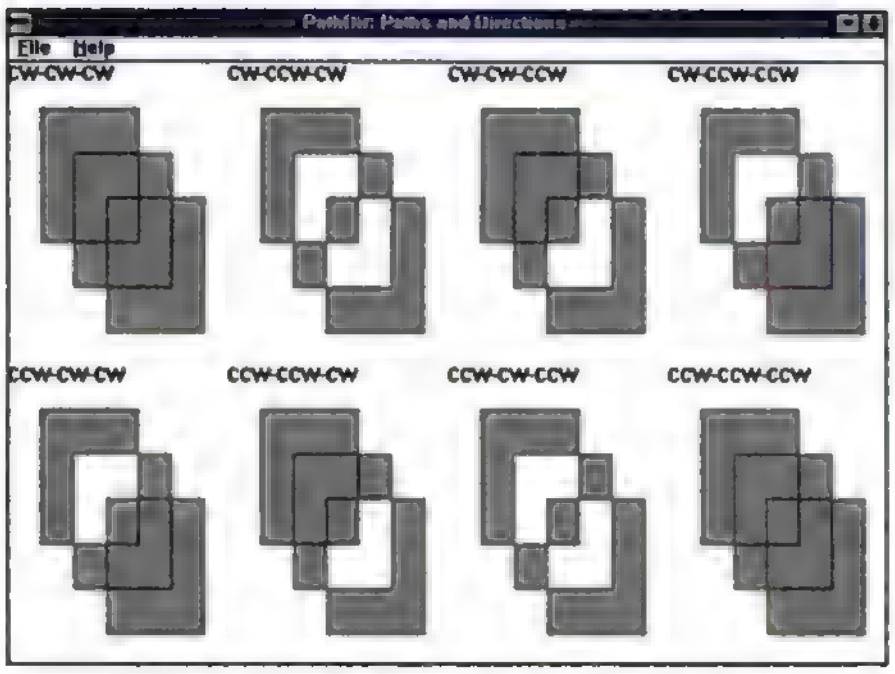


Figure 6: **The PATHDIR display shows how interiors are filled based on the direction in which the rectangles are drawn. (Note that "CW" and "CCW" stand for clockwise and counterclockwise, respectively.)**

ecutables, from PC MagNet's Programming Forum archived as PATHOP.ZIP. The PATHOPS display is shown in Figure 4.

PATHOPS draws a blob-like figure that consists of 12 connected Bezier splines. The end points and control points of these splines are points on the circumferences of two hexagons. The upper-left corner of the display shows the figure drawn without paths using the default pen. This is the closest you can really come to a visual representation of the path itself. The path is stored in memory as a series of coordinate points, without any style, color, or width.

The upper-right corner of the display shows the path stroked with a wide pen that has a pattern of red diagonal lines against a blue background. The lower-left corner shows the path filled with a solid green color. The lower-right corner shows the path both filled and stroked.

FILLING AND DIRECTIONS A path can comprise many subpaths, the interiors of which can overlap. Even a single subpath can have overlapping interiors. When you call FillPath or StrokeAndFillPath, GDI uses the polygon-fill-mode attribute to determine how the interiors are filled. You set this attribute using

```
SetPolyFillMode (hdc, iMode) ;
```

In the DOS-based version of Windows, the polygon fill mode only affects overlapping areas in figures drawn by Polygon or PolyPolygon. It has now been extended to paths.

The iMode parameter can be either ALTERNATE or WINDING. In the alternate mode, you can determine whether an interior is filled using the following rule: Draw an imaginary line from an interior to infinity. If that imaginary line crosses an odd number of lines in the path, the interior is filled; otherwise, it is not.

The winding mode is more complex, because you must think of the lines as being drawn in a particular direction. For example, in this case:

```
MoveToEx (hdc, 100, 100, NULL) ;
LineTo (hdc, 200, 200) ;
```

the line is drawn from the point (100,100) to (200,200).

To determine whether an interior is filled in the winding mode, again draw an imaginary line from the interior to infinity. If the imaginary line crosses the same number of lines drawn in one direction as in the other, the interior is not filled; otherwise, the interior is filled.

Now we've encountered another problem: If the winding mode is dependent on the directions in which lines are drawn, what happens with rectangles and ellipses? Under the DOS-based version of Windows, the drawing direction is undefined. Under Windows NT, the default drawing direction is counterclockwise. However, you can change that with a call to

```
SetArcDirection (hdc, iDirection) ;
```

You use the AD_CLOCKWISE parameter to have GDI draw figures in a clockwise direction, or you can set the arc-direction attribute back to the default with AD_COUNTERCLOCKWISE.

PATHDIR.C
Complete Listing

```
/*ÐÐÐÐÐÐÐÐÐÐÐÐÐÐÐÐÐÐÐÐÐÐÐÐÐÐÐÐÐÐÐÐÐÐÐÐÐÐÐÐÐÐ
   PATHDIR.C DD Paths and Directions
               (c) Charles Petzold, 1994
  ÐÐÐÐÐÐÐÐÐÐÐÐÐÐÐÐÐÐÐÐÐÐÐÐÐÐÐÐÐÐÐÐÐÐÐÐÐÐÐÐÐÐ*/

#include <windows.h>
#include <string.h>

char szClass [] = ÓPathDirÓ ;
char szTitle [] = ÓPathDir: Paths and DirectionsÓ ;

void PaintRoutine (HWND hwnd, HDC hdc, int cxArea, int cyArea)
     {
     static char * szLabel [] = { ÓCWÓ, ÓCCWÓ } ;
     char          szBuffer [16] ;
     int           iDir1, iDir2, iDir3 ;

               // Set up an anisotropic display area

     SetMapMode (hdc, MM_ANISOTROPIC) ;
     SetWindowExtEx (hdc, 100, 100, NULL) ;
     SetViewportExtEx (hdc, cxArea / 4, cyArea / 2, NULL) ;

               // Set some display attributes

     SelectObject (hdc, GetStockObject (GRAY_BRUSH)) ;

     SetPolyFillMode (hdc, WINDING) ;

               // Cycle through the combinations

     for (iDir1 = 0 ; iDir1 < 2 ; iDir1++)
     for (iDir2 = 0 ; iDir2 < 2 ; iDir2++)
     for (iDir3 = 0 ; iDir3 < 2 ; iDir3++)
          {
          SetViewportOrgEx (hdc, (2 * iDir3 + iDir2) * cxArea / 4,
                                  iDir1  * cyArea / 2, NULL) ;

                    // Display the labels

          wsprintf (szBuffer, Ó%s-%s-%sÓ,
                    szLabel [iDir1], szLabel [iDir2], szLabel [iDir3]) ;

          TextOut (hdc, 0, 0, szBuffer, strlen (szBuffer)) ;

                    // Create a path with three rectangles

          BeginPath (hdc) ;

          SetArcDirection (hdc, iDir1 ? AD_COUNTERCLOCKWISE : AD_CLOCKWISE) ;
          Rectangle (hdc, 15, 15, 60, 60) ;

          SetArcDirection (hdc, iDir2 ? AD_COUNTERCLOCKWISE : AD_CLOCKWISE) ;
          Rectangle (hdc, 30, 30, 75, 75) ;

          SetArcDirection (hdc, iDir3 ? AD_COUNTERCLOCKWISE : AD_CLOCKWISE) ;
          Rectangle (hdc, 45, 45, 90, 90) ;

          EndPath (hdc) ;

          StrokeAndFillPath (hdc) ;
          }
     }
```

Figure 5: **The PATHDIR.C program demonstrates filling overlapping path interiors using the arc direction.**

Yes! That's 62% off on every issue!!!

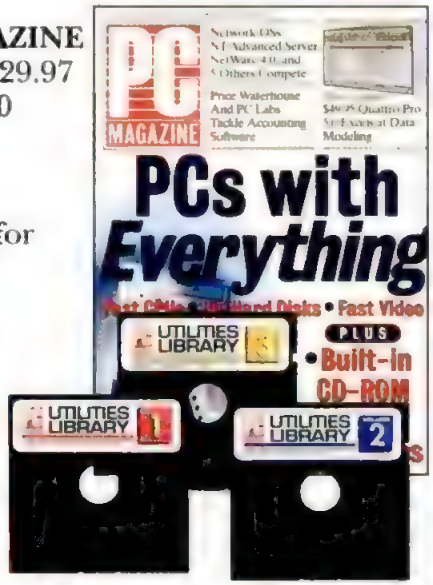
Call now to get PC Magazine delivered to your door for up to 62% less than you'd pay at the newsstand.

Act fast...
and get software FREE!

Call now and you'll get our new-subscriber bonus — 3-disks packed with 146 all-star utilities for DOS, Windows™ and Laptops — FREE with your paid order!!!

- 1 YEAR of PC MAGAZINE (22 issues) for only $29.97 — 54% off the $64.90 cover price!
- SAVE MORE! 2 YEARS (44 issues) for only $49.97 — that's 62% off!

BONUS: 3-DISK UTILITIES LIBRARY — FREE!



PC MAGAZINE

CALL 1-800-289-0429

To insure savings and bonus, be sure to mention this code when you call: 4Z94

You can call SetArcDirection within a path bracket to change the drawing direction as the path is being created. SetArcDirection only affects line-drawing functions based on bounding rectangles. These functions are Arc, ArcTo, Chord, Ellipse, Pie, Rectangle, and RoundRect.

Although SetArcDirection is not explicitly a path function, it is of use only when rendering paths and then only when using the winding fill mode. When not using paths, it doesn't matter how GDI draws the seven figures listed above. (That's why we didn't miss having this function in the DOS-based version of Windows.)

SetArcDirection is not explicity a path function, it is of use only when rendering paths and then only when using the winding fill mode.

Let's see if GDI is really smart enough to implement the winding mode. The PATHDIR program shown in Figure 5 renders eight versions of the same path composed of three overlapping rectangles drawn with various combinations of clockwise and counterclockwise directions. The results are shown in Figure 6.

Each of the eight figures has labels showing combinations of CW (clockwise) and CCW (counterclockwise), indicating the arc direction set for the three rectangles. In all cases, the polygon fill mode is winding. Using the alternate fill mode, you'd get uniform results identical to the two figures labeled "CW-CCW-CW" and "CCW-CW-CCW."

You may never need to fill interiors in such odd ways, but that's really not the point. The point is that you should not be startled by the results of your graphics code. But startled you may indeed be when you see how WidenPath works. I'll be covering that function in the next issue, along with PathToRegion and SelectClipPath. □

Utilities

BY DOUGLAS BOLING

ThinDisk: A Fat Trimmer for Disks

If there's anything more irritating than seeing a "Disk Full" message, it's going through the thousands of files on your hard disk looking for stuff to delete. Scanning the files and attempting to free up space cluster-by-cluster is one of the most time consuming, useless, and nonproductive tasks that a user must sooner or later take on. I've had enough of rummaging through my files manually; that's why I wrote ThinDisk.

ThinDisk is a Windows utility especially designed to help you review the contents of your disks. It makes a list of all the files on your system and sorts them by name, extension, size, or date. It allows you to create lists of special categories, such as files over 10,000 bytes. A search feature in ThinDisk lets you find files by name, size, date, or file attributes. Finally, copy and delete functions allow you to act on the information presented to you by ThinDisk.

If you think your hard disk needs slimming down, you can get ThinDisk at no cost from *PC Magazine*'s PC MagNet or by mail; refer to the sidebar "Guide to Our Utilities & How to Get Them" for the details. All of the files are available, from the THINDISK.EXE file to the C source code archived as THINDI.ZIP. To compile the utility, you will need a C compiler that can target Windows programs.

SLIMMING DOWN WITH THINDISK To run ThinDisk, just select File|Run from Windows' Program Manager. If you think you'll be using ThinDisk frequently, you may want to use the File|New command to place the ThinDisk icon into one of your Program Manager groups. However you start ThinDisk, it will first appear as a window on your desktop, with a dialog box asking what drives you want to work on. Select the drives by clicking on the drive letters in the list box. When you click the Refresh button, ThinDisk will scan the selected drives to make a list of all files found. This process may take up to a minute, but once it's done, the slow part of ThinDisk is behind you.

When the dialog box disappears, you will see a message on the ThinDisk status bar telling you that ThinDisk is sorting the files and how the sort process is progressing. ThinDisk is friendly to other Windows applications in that during the scanning and sorting process, you can switch to other applications to get other work done. The only caveat to this is that you should not write or update files on a drive that ThinDisk is scanning. If you do, the files listed by ThinDisk will not accurately reflect the contents of the drives you scanned.

After the sort process is complete, ThinDisk presents you with a list of all the files on the selected drives sorted by name. You can use the Up Arrow and Down Arrow keys or the mouse to navigate through the list. As with all multiple-selection list boxes, the ThinDisk list-box items can be selected using the Spacebar or by clicking on an item with the mouse. Multiple items can be selected if you hold down the Ctrl key when selecting additional items. The status bar located below the list box will display the message, "All files sorted by name," and the number of files in the file list. One warning here: If ThinDisk presents the message, "Too many files," select the File|Refresh menu and select fewer drives to scan. ThinDisk can only process 16,384 files in any one list.

The easiest way to explain the many functions of ThinDisk is to take a walk around the ThinDisk menus. Pulling down the Files menu reveals the Refresh, Copy, Move, Delete, and Exit choices. The Refresh function tells ThinDisk to scan your drives again for files. Refreshing the ThinDisk list is occasionally necessary, since as you Move, Copy, and Delete files, the actual contents of your disk differs more and more from the original scanned list.

The Copy, Move, and Delete functions do just what you would expect. To copy files, highlight them in the list box and select the Copy menu. A dialog box with a list of the files you have selected will be displayed for confirmation. Below the list is a field where you can enter the new drive and path for the file or files. After entering the destination path, click the Copy button to have ThinDisk copy the files.

As you would expect, the Move command copies the source files to the destination directory, then deletes the originals. The Delete command simply deletes the selected files.

With directories, Copy, Move, and Delete work a little differently than you might expect. These file operations act only on files that are in the current list. So if you are displaying a list that contains only .DOC files and you delete a directory, ThinDisk will only delete the files with a .DOC extension that are in the "deleted" directory and subdirectories. All the other files will remain. This, of course, means the directory itself is not removed, since other files with different extensions may remain in the directory. Actually, ThinDisk won't even list directories un-

Top 10 Utilities

Rank	Utility
1	**MONTOR** - *Monitors system resources*
2	**CHANGER** - *Changes look of desktop*
3	**WTIME**- *Keeps PC clock accurate*
4	**INCTRL**- *Installation control*
5	**BAT2EXEC** - *Compiles batch files*
6	**DRVLOAD**- *Installs device drivers*
7	**PCTODAY** - *Lists files with current date*
8	**BUGS** - *Windows 3.1 screen saver*
9	**FINDIRQ** - *Locates available IRQs*
10	**PRN2FILE** - *Captures printer output*

This list is based on the total number of downloads each utility has had on PC MagNet over the past 12 months. To download these files, type GO ZNT:TIPS. For more information, see the sidebar "Guide to Our Utilities & How to Get Them"

less specifically configured. I will discuss how to limit the files being displayed and how to enable directory listings in a moment. For now, I continue with the next menu: Search.

If you select the Search|Find Entry menu, ThinDisk will present you with a rather unusual search dialog. Instead of the simple text search or filename search that you might expect, the ThinDisk search dialog allows you to search on the name, the size, the date, the file attributes, or any combination of these categories. The bottom of Figure 1 shows how the Search dialog box appears.

For example, to look for all files with a .SYS extension that are hidden on your hard disk, follow these steps: Click on the filename check box and enter *.SYS in the adjacent entry field. Then click on the File Attributes check box and clear all the flag check boxes except for the Hidden Attribute check box. Clicking on the Find button will cause ThinDisk to search through the list of files, looking for one that matches these particular characteristics. If you are running DOS and the list contains your boot drive, you will probably see that ThinDisk has found IO.SYS, one of the system files for DOS. When a file is found, ThinDisk scrolls the list box so that the found file is in view and selects it. If ThinDisk does not find a matching file, a "File not found" message is displayed on the status bar.

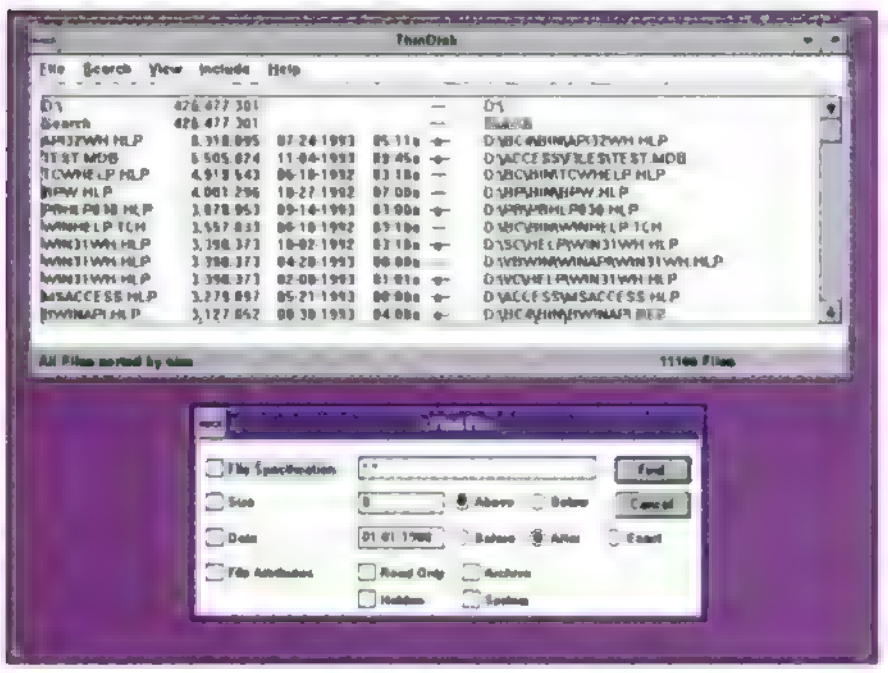


Figure 1: **This figure shows the Search dialog box. Files can be searched using a variety of characteristics, including name, size, and date.**

Searches are started at the current location in the list, so if there are matching files listed before current position, Find will miss them. Take heart, though; there is a way to find those files, too. If you want to look for a matching file that is earlier in the list, select the Search|Find Previous menu selection. As with Find, Find Previous starts its search at the current position in the list. To find the next file in the list that matches the search attributes, select the Search|Find Next menu.

The View menu provides you with various functions that manipulate the current list. The Invert Sort menu item inverts the order of the file list. For example, if your files are listed in alphabetical order, selecting Invert Sort will cause them to be listed in reverse alphabetical order. Selecting the Invert Sort menu item again causes the list to revert back to the original alphabetical order. Of course, this function is not limited to the name sort; it will invert any of the other sorted lists as well.

The Sort by Name, Sort By Extension, Sort by Size, and Sort by Date menu items do just what you'd think, allowing you to sort the file list by any of these characteristics. Each time a new sort criteria is selected, ThinDisk will sort the original list into the new order. As with the default Sort by Name, the progress of the sort is indicated on the status bar. Try selecting the Sort by Size menu item. After the sort has finished, you should see the largest files at the top of the list.

You will also see an entry labeled "Search" at the top of the list. This entry reflects the total size of all files listed in the list and provides a handy way to see how much space is taken up by the files in the list.

Now switch back to the name sort by selecting the Sort by Name menu item. Notice that the list box fills almost immediately. This is because ThinDisk remembers the previous list sort so that it needs to be sorted by a category only once. This can save a lot of time when switching between sort categories.

The next four menu items—Show Size, Show Dates, Show Attributes, and Show Path—let you configure what information is presented for each of the files in the list. When you first launch the program, all four items are enabled, providing complete information about each file. The Show Attribute menu item works like a toggle. When you click on it the first time, the attribute display will be eliminated from the listing. Selecting Show Attribute again will restore the attribute display. Note that you can search on any category, whether it is displayed in the list box or not. For example, you can search for a hidden file even if the attribute flags are not displayed. So you can quickly check your settings, a check mark appears next to menu items that are displayed in the list.

The Include menu provides control over the most powerful feature of ThinDisk: Include Set. By default, all the files on the selected drives are listed—potentially thousands of files. Include Set lets you define a set of criteria for displaying files in the list—a sort of filter. For example, you may want to look only at files of over 10,000 bytes, all hidden files, or all files last modified on September 6, 1987.

Clicking on the Include menu will display the Define Include Set and Delete Include Set menu items and after a separator, the All Files menu item. Selecting the Define Include Set item will display a dialog box very similar to the Search dialog. In fact, the only differences are the Include Set Name entry box and some check boxes concerning directories. Fill in the Include Set dialog the same way you did the Search dialog: Select the criteria to inspect using the check boxes and their corresponding template fields. Be sure to fill in a descriptive name for the Include Set name; it will be used by ThinDisk to label the resulting list.

Two check boxes, Include Directories and Include Empty Directories, allow you to define how directories are handled. When the Include Directories check box is checked, directories that contain files matching the Include Set criteria are listed in the list. If the Include Empty Directories check box is checked, all directories, regardless of whether they contain matching files, are listed.

Now for an example: Let's create a list of all .LST files over 10,000 bytes. First click on the filename check box and enter *.LST in the corresponding entry field. Click on the Size check box, enter 10,000 in the entry field, and click on the Above radio button. When you click the OK button, ThinDisk will scan the list of files for all files that match the criteria, sort the list, then present the list in place of the

current All Files listing. Notice that the status bar now indicates that the list is created from your Include Set and that the Number of Files field now shows how many files are in this new list.

If you pull down the Include menu again, you will see that the name of the Include Set you defined is now listed on the menu just below the All Files menu item. ThinDisk will remember the last seven Include Sets that you define. If you define an eighth Include Set, the first user-defined Include Set in the list will be removed to make room for the new Include Set. When you close ThinDisk, the Include Set definitions listed in the Include menu are saved so that when you restart ThinDisk, those Include Sets can be quickly accessed again.

To return to the listing that contains all the files, select the All Files set. The All Files set is always available so that you can quickly produce a list of all files on the selected drives. When you display an Include Set, the Search function only searches the files listed in the current Include Set. So if you have an Include Set that only contains files with an .LST extension and you search for a file with an .SYS extension, the search will fail even if files with an .SYS extension exist on your hard disk.

The Edit Include Set menu item allows you to edit any of the Include Sets you have defined. A list of the Include Sets is presented. When you select one, an Include Set definition dialog box is presented with the Include Set definition data in the appropriate fields. An additional button, Save as New, allows the edited data to be saved as a new Include Set instead of replacing the one being edited.

The Delete Include Set menu item lets you delete the Include Sets you've defined, one at a time. Selecting the menu item will display a dialog box with all the user-defined include sets. To delete a set, simply select the name of the Include Set from the dialog box and click the OK button.

The last menu item, Help|About, displays the About dialog, which contains information about the program, such as the name and copyright. Now that we're done with our tour of the ThinDisk menus, let's see how ThinDisk works behind the scenes.

LOTS OF LISTS The key design goal of ThinDisk was to make a disk manager that could display thousands of files in many different ways and do it quickly. Since hard disks are notoriously slow, the only way to get the speed was to produce a list of all the files in system memory, and work only on that list. ThinDisk is designed so that it never has to go back to the disk except for the Move, Copy, and Delete operations. All the other operations use data stored in speedy RAM.

While the memory requirements for ThinDisk are huge by DOS standards, they are within the normal limitations of a Windows program. Approximately 30 bytes of memory are required for each file, plus 4 bytes of memory for each sort you perform. On a 5,000-file disk, this works out to around 150K just for the file data. On my two-disk, three-partition machine with one of the partitions stacked, ThinDisk needs almost half a megabyte of RAM just to hold the data for the 13,567 files and the necessary index segments. In short, while ThinDisk works fine on the minimum required configuration for Windows 3.1 (a 386 computer with 4MB of RAM), it's not a program you'd want to leave on your desktop as an icon, sucking up memory.

When a user selects the drives to be scanned, ThinDisk starts in the root directory of the drive and uses the findfirst() and findnext() functions from the standard C runtime library to find and record all the files. When a subdirectory is found, the routine is called recursively to record the files in the subdirectory. This process continues until all the files on the drive have been found. If the Refresh List includes more than one drive, the other drives are then scanned.

The data for each file is kept in multiple 64K segments in global memory. Each segment contains a 6-byte header with the segment handle of the previous and next segment as well as the size of the segment.

You may wonder why I chose not to use huge segments, blocks of memory larger than 64K that (through a little behind-the-scenes compiler magic) appear as one large continuous block of memory. The problem is that huge memory blocks have some limitations. One limitation is that the size of any structure mapped into the block must be a power of 2. This is necessary to prevent an individual structure from straddling a 64K segment boundary. My file structure is 26 bytes, so I'd have to use a 32-byte segment, quite a waste. That, along with the overhead of manipulating huge pointers, led me to use linked 64K segments for ThinDisk.

The 26-byte structure that holds the vital statistics for each file is shown in Figure 2. The first member of the structure, lpParent, is a pointer to the directory that contains the file. If the file is in the root directory, this is a pointer to a drive entry. Drive entries contain a 0 in this member, since they have no parent and no path data is needed. When a path is needed, the parent pointers can be traced back to the root to determine the name of every directory above the file.

The remainder of the structure, from the ucAttrib to szName, exactly matches the FIND_T structure, which is used to return data from the findfirst() and findnext() C library functions. The reason for this is speed. When the scan routine is searching the drive for files, the results stored in the FIND_T structure are sim-

File Statistics Structure

```
typedef struct {
   LPVOID lpParent;
   BYTE ucAttrib; // The remainder of this structure
   UINT usTime; // must match the C file search
   UINT usDate; // structure.
   LONG lSize;
   char szName[13];

} MYDIRENTRY;
typedef MYDIRENTRY far * LPMYDIRENTRY; // Far pointer to entry
typedef LPMYDIRENTRY far * LPLPMYDIRENTRY; // Far pointer to an entry's
                                           // far pointer
```

Figure 2: **This 26-byte structure holds the vital statistics for each file. The first member of the structure, lpParent, is a pointer to the directory that contains the file.**

ply copied into the last part of the MYDIRENTRY structure.

As each structure is filled, a pointer to the structure is inserted into what I call the "master index array." The master index array is an array of far pointers kept in a single 64K segment. These pointers are used to look up each of the file-data structures that are kept in the linked 64K segments. Since the far pointers to the directory entries are each 4 bytes, the 64K master index segment can hold a maximum of 16,384 pointers, and thus ThinDisk is limited to processing 16,384 files at one time.

After the scan is complete, ThinDisk calls a routine to create an Include Set. This routine creates a second index array, which contains pointers to the file structures that match the Include Set criteria. The Include Set function is actually quite simple. The routine looks at each file entry by using the pointers in the master index. If an entry matches the predefined criteria, its pointer is copied from the master index to a secondary index segment.

After the secondary index has been constructed, it is sorted using the current sort selection: name, size, extension, or date. When the user selects another sort method, an additional secondary index is constructed and sorted using the new method. Up to four secondary indexes may be created, one for each sort selection. When a sort is reselected, ThinDisk just switches back to one of the already sorted secondary indexes.

To summarize, data for all the files is kept in multiple, linked, 64K segments. Each file's data is kept in a structure that contains the filename, file size, date, and attribute flags. As the file entry is filled in, an entry is made into a master index, which is an array of pointers that points to each of the file data structures. Finally, a secondary index is constructed, which contains the file entries that match the current Include Set criteria.

While all these structures and index arrays may seem to be overkill, the result is speed. With all the file information in memory, ThinDisk never has to go back to the disk. The master index allows quick lookup of all entries without having to traverse the linked list of segments. Finally, separate copies of the secondary indexes are kept for each of the sorts, enabling you to quickly switch among the sorted views.

THE LIST BOX PROBLEM What should be a simple task, listing the files in a list box, is actually quite complicated. List box controls, like all 16-bit code in Windows, are limited to 64K of local memory, and half of that is used to maintain the list. This means that the total text contained in a list box cannot exceed 32K. This is plenty for most applications, but for ThinDisk with its thousands of files, you can run into the 64K limit quite fast.

> ***With all of the file information stored in memory, ThinDisk never has to go back to the disk.***

One way around this problem is to use an owner-drawn list box. Owner-drawn list boxes (without the LBS_HASSTRINGS window style) do not contain the strings displayed in the box. A 4-byte long word is kept by the list box for each entry in place of the string data. The long word can then be used to point to the actual text displayed in the list box.

Even the owner-drawn list box hits the 64K limit fairly quickly. Each entry in an owner-drawn list box requires 8 bytes: 4 to hold the user-defined long word and 4 to hold state information. These requirements, plus an additional 256 bytes used by the list box for overhead, limit a standard, owner-drawn list box to 8,160 entries.

Since the 8,160 limit is too constraining for ThinDisk, I used a virtual list box. A standard Windows list-box control is used to display the items in the list that are visible to the user, but ThinDisk handles the maintenance of the complete list.

When the virtual list box is initialized, ThinDisk fills the visible portion of the list box control. If the user scrolls down, the next item in the sorted index array is inserted in the list box control, and the first item—the one about to scroll off the top—is removed. Thus, the list box handles the user-interface issues of selection and keyboard handling, while ThinDisk manages the items in the list.

THE STATUS BAR One interesting feature of ThinDisk is its status bar. Ever since I started writing Windows utilities, I have used the title-bar text of individual windows to display status information. This is an easy solution since title-bar text is changed by a simple call to the SetWindowsText() function—the closest thing to printf() in the Windows API. The problem with this approach is that many scripting programs use the title-bar text of a window to identify it. If the title bar text is constantly changing with status information, the window can be difficult to track. A status bar, common in commercial applications, solves the problem.

I needed a status bar that is easy to use, is simple to configure, and most of all, has as little impact as possible on the remainder of the program. One of the neat features I have seen on status bars is the one-line summary of individual menu items that is displayed when a menu item is highlighted. I wanted this, too.

I started with a separate source file. Normally, I use only one source file for my utilities so that programmers interested in the code will not have to hunt through multiple source files to find a particular routine. For the status-bar code, I made an exception. The separate source file allows the code to be ported easily among my utilities, and it keeps the status-bar code from cluttering up the utility-specific code.

To make the status-bar feature easy to incorporate, I kept the interface between the status bar and the rest of the program down to four functions. They are

```
INT StatusBarInit(HANDLE);
INT StatusBarCreate(HWND, INT,
  INT *);
INT ModifyClientRect(HWND, RECT *);
INT SetStatusBarText(HWND, char
  *, INT);
```

StatusBarInit() is called once when the first instance of the program is executed. A convenient place to call this function is immediately after a program registers its main window class. In fact, that is what StatusBarInit() does; it registers the status-bar window class and returns. The only parameter for StatusBarInit() is the instance handle for the program.

The StatusBarCreate() function should

be called immediately after the program has called CreateWindow() to create the main window for the program. As might be expected, StatusBarCreate() creates the status-bar window. The other function of StatusBarCreate() is to define the size and number of the text fields for the status bar. The status bar can have any number of individually addressable text fields, each of a specific size. In addition, one field may be designated as variable length. The length of the variable-length field adjusts as the user changes the size of the window. Parameters for CreateStatusBar() are the handle of the main window, the number of text fields desired, and a pointer to an array of integers that contains the lengths of each of the text fields, with the variable-length field listed as length 0.

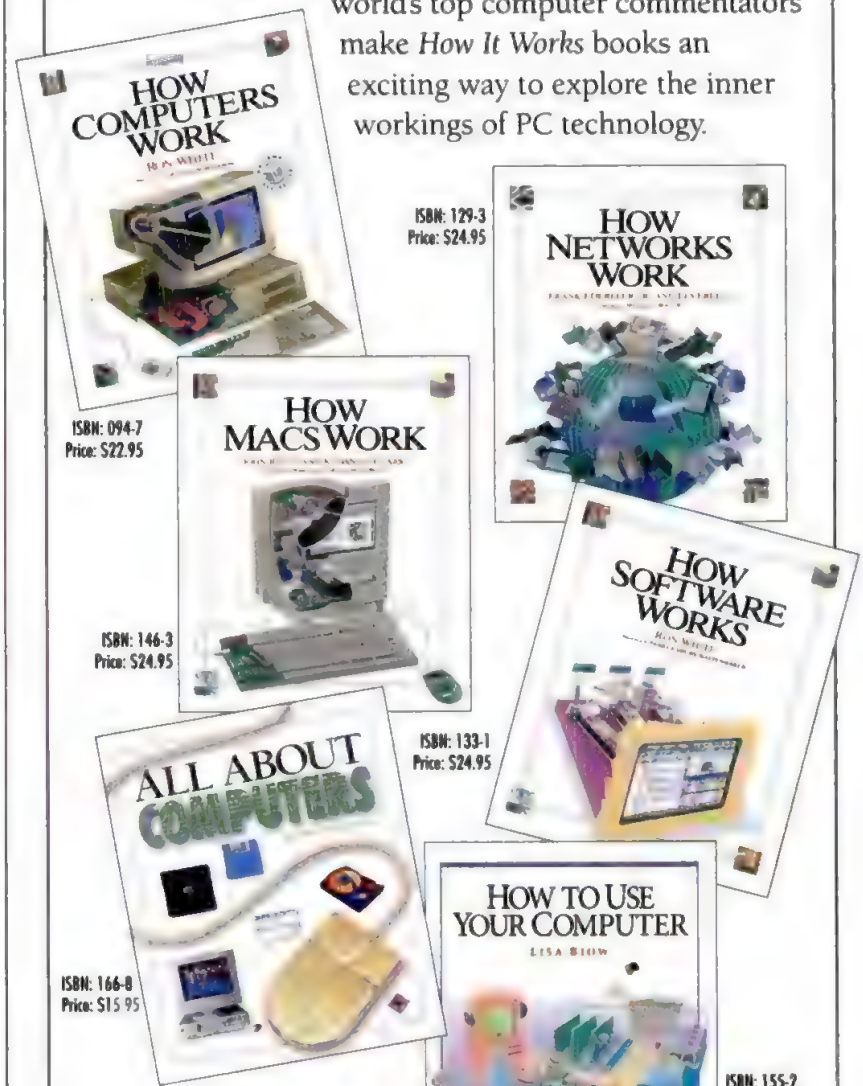
The only other function necessary for the status bar is the ModifyClientRect() function. It is standard operating procedure for a Windows program to call GetClientRect() to determine the size of the client window. Unfortunately, there is no way for another window, such as a status bar, residing in the nonclient portion of the window to adjust itself based on the result of GetClientRect(). This forces a program to call ModifyClientRect() to reduce the size of the status bar along the bottom of the window. So when using this status-bar code, a utility must call ModifyClientRect() following each call to GetClientRect().

Now that the hard work is done, a program can simply call SetStatusBarText() to set the text of any field in the status bar. This function takes three parameters: the handle of the client window, the text to display, and the number of the field to display the text (starting with 0). The status-bar window will store the text so that once SetStatusBarText() is called, the status bar will display that text until another call is made to change the text. Painless!

The remaining feature of the status bar is to display the one-line summary of the menu items. This is accomplished by subclassing the status bar's parent window. When a WM_MENUSELECT message indicating that a menu item has been selected is sent to the main window, the status-bar code reads the ID of the highlighted menu item, adds a programmer-defined offset, and loads a string resource that matches the ID plus the offset. The

Imagination.
Innovation.
Insight.

No other books bring computer technology to life like the *How It Works* series from Ziff-Davis Press. Lavish, full-color illustrations and lucid text from some of the world's top computer commentators make *How It Works* books an exciting way to explore the inner workings of PC technology.



AVAILABLE AT ALL FINE BOOKSTORES OR CALL 1-800-688-0448, EXT. 8367

© 1993 Ziff-Davis Press

string is then displayed in the first text field of the status bar. So the programmer need only supply the appropriate string resources for each menu selection in the window's menu.

The final status-bar design decision was how to encapsulate the code. I could have written the status bar as a control stored in a separate DLL. The problem with this approach is that users would have to remember to copy this file when they copy the utility to another machine. Another possible solution would have been to append the status-bar code to the source file of the utility, but that would have cluttered up the utility-specific code. I finally settled on a separately compiled object module that is bound in at link time. This provides some isolation, since the status bar is in a separate module, but avoids the end-user inconvenience of a DLL.

ThinDisk is a utility that can help out at the most frustrating of times: when you're cleaning off that cluttered hard disk. It is designed to make weeding your hard disk just a bit less painful. So go ahead and slim down that disk! □

DOUGLAS BOLING IS A CONTRIBUTING EDITOR OF *PC MAGAZINE*

GUIDE TO OUR UTILITIES & HOW TO GET THEM

ThinDisk

PURPOSE: ThinDisk makes it easier to trim the fat from your hard disk by deleting unneeded files. It can list all the files on your hard disk or only those meeting certain criteria. You can search for files by name, size, date, or file attributes. When you've found the files you're looking for, you can use ThinDisk to copy or delete them.

SETUP: The first step in installing ThinDisk is to copy THINDISK.EXE to your hard disk. It doesn't matter where you put it; it need not be in your PATH. You can run ThinDisk by using the File!Run menu choice in Windows' Program Manager, but if you think you'll be using ThinDisk frequently, you may want to use the File!New command to place the ThinDisk icon into one of your Program Manager groups. You can then launch ThinDisk by double-clicking on its icon.

REMARKS: ThinDisk is a Windows utility specially designed to help you review and prune the contents of your hard disks. It makes a list of all the files on your system, and then lets you sort them by name, extension, size, or date. If you don't want to view all the files at once, you can choose to display only those files meeting certain criteria, such as .LST files over 10,000 bytes long.

Another way to navigate through the file list is to use ThinDisk's search feature. You can hunt for files by name, size, date, or file attributes.

Once you've found the files of interest, you can use ThinDisk's Copy and Delete functions to act on the files and trim the fat from your hard disk.

You can look at the files on several drives at once, but only if there are fewer than 16,384 files. If there are more files than that on the drives you have selected, ThinDisk will inform you of the problem and ask you to select fewer drives.

PC Magazine's utilities are available by modem from PC MagNet, our on-line service. PC MagNet is part of ZiffNet, a group of on-line services from Ziff-Davis Publishing Company. ZiffNet is hosted by CompuServe Information Service

THE FIRST TIME If you've never used ZiffNet, you'll need to find the access number nearest you. First, set your communications software to 7 data bits, even parity, no stop bits, and full duplex. Then dial 800-346-3247 with your modem. When the modem connects, press Enter. At the HOST NAME prompt, enter PHONES. Follow the menus and note the closest access number. Or dial 800-635-6225 (voice) and follow the instructions.

HOW TO JOIN ZIFFNET Dial the local access number. At the HOST NAME prompt, enter CIS. At the USER ID prompt, type 177000,5000. When you see the PASSWORD prompt, enter PC*MAGNET. Finally, when you see the ENTER AGREEMENT NUMBER prompt, enter PCMAG94. Current CompuServe members can type GO PCMAG at any CompuServe ! prompt. Once you enter your billing information, you'll see your personal user ID and temporary password.

MEMBERSHIP PRIVILEGES Membership costs $2.95 per month. As a ZiffNet member, you receive free access to *PC Magazine* Editors' Choice awards, Product Reviews Index, weekly news from *PC Week*, Buyer's Market, ZiffNet Highlights, the Support Forum, and the current utility (type GO ZNT FREEUTIL). For other services, connect-time charges vary according to the speed of the modem used. Billing is based on 1-minute increments. You can also download all of *PC Magazine*'s utilities and tips. Just type GO ZNT TIPS

FREE UTILITY You can download this month's utility, free of charge, from *PC Magazine*'s BBS by dialing 617-231-4450 with your modem. Just enter your name at the prompt and follow the menus.

NO MODEM, NO PROBLEM If you don't have a modem, you can get our utilities by mail. Just send your request with your name, address, and preferred disk size to Public Brand Software, P.O. Box 51315, Indianapolis, IN 46251; fax, 317-856-2086

COPYRIGHT INFORMATION The programs presented in *PC Magazine* can be copied but are copyrighted. You may make copies for others if no charge is involved, but making copies or using any portion for any commercial purpose is strictly prohibited

PC Solutions

TIPS AND TECHNIQUES TO INCREASE YOUR PRODUCTIVITY

Operating Environments

DISABLING DOS'S TIME AND DATE COMMANDS

? My company publishes a time-clock and employee-attendance software package called PC-Punch Gold. We need to know if there is any easy way to disable DOS's TIME and DATE commands.

Raymond Ng
San Antonio, Texas

▶PC MAGAZINE: Certainly if the PC is functioning as your company's time clock, you don't want to let employees reset the time. There are various approaches you could take to keep the clock ticking steadily, depending on the level of PC expertise among your employees.

Since a DOSKEY command takes precedence over a DOS command with the same name, one simple solution would be to redefine TIME in the following way:

```
DOSKEY time=ECHO.$bTIME
```

When this macro executes, the `$b` metastring is replaced by the pipe character (|). The `ECHO.` produces a blank line, which is piped into the TIME command. This terminates the command without allowing further input, and the DOSKEY macro ignores any command line parameters. Thus, the user can enter TIME to see the current time but cannot change it. Put this line and a corresponding line for the DATE command into your AUTOEXEC.BAT.

An astute user might notice that when he enters the DATE command, it expands into its macro value and deduce that DOSKEY is in use. Simply by preceding TIME with a space, this user could sidestep the macro and call the actual TIME command. To protect the internal clock from such a clever user, you'll have to patch COMMAND.COM itself.

First, copy COMMAND.COM to CPATCH.COM, then load the copy into DEBUG with the command `DEBUG CPATCH.COM`. Enter the DEBUG command `RCX` and press Enter twice; make a note of the four-digit hexadecimal number reported. Now tell DEBUG to search for the string "TIME" using the command `S CS:100 L #### 'TIME'`, replacing `####` with the four-digit number you noted. DEBUG will report one or more addresses (pairs of four-digit hexadecimal numbers separated by a colon). Make a note of these addresses.

For each address, enter the command `D ####:####`, replacing `####:####` with the address. The data displayed for the correct address will include a dozen or so DOS command names with a scattering of random characters between them. Now you must make a choice. You can disable the TIME command, or you can give it a new name consisting of four uppercase letters, perhaps TTTT. To disable the TIME command, enter the DEBUG command `E ####:#### 'time'`, where `####:####` is the correct address. To rename it, enter the command `E ####:#### 'TTTT'`. Now enter the command `W` to write your changes to disk and `Q` to quit DEBUG.

Back at the DOS prompt, test your work by entering CPATCH—this will load your patched copy of COMMAND.COM. When you enter TIME, you should get the message "Bad command or file name". If you renamed the command, enter the new command name and verify that it lets you set the time. Use the EXIT command to end your secondary command processor. Now rename COMMAND.COM to COMMAND.OLD, and rename CPATCH.COM to COMMAND.COM. When you reboot, the TIME command will no longer be available. Follow the same procedure to disable or rename the DATE command.

If you have employees with the skill to undo your patch job, and you don't trust them not to use that skill, you're in trouble! You could have a programmer write a TSR that would intercept and disallow the internal DOS functions that reset the system clock. However, a user smart enough to get around your patched COMMAND.COM will surely be able to defeat this TSR as well.

—Neil J. Rubenking

SOLUTIONS INDEX

Operating Environments
Disabling DOS's Time And Date Commands.....333
A File Manager Problem.....336
An AUTOEXEC.BAT For a Windows DOS Box.....336
Word Processing
Helping WinWord Find Its Help Files.....337
Spreadsheets
End of the Line.....338
Databases
Numeric Day of the Year Revisited.....348
Graphics
Textile Design Systems.....356

PC DIRECT

PC DIRECT starts here with exciting offers from top direct vendors.

See index, page 337.

FINALLY, A SYSTEM WITH YOU'D ACTU

You get a big VS15 Color Monitor.

Our Sound Studio Software has a CD and MIDI player, mixing panel, wave recorder and sound effects library.

A Multi-Session, Double-Spin CD ROM Drive is included.

You'll also find a Labtec Dynamic Microphone.

Software is pre-loaded. (Packaging not included.)

We've installed a VL #9GXE Video Card for face-warping video.

And a Sound Blaster 16-bit Audio Card, which makes for awesome sound on our...

Exclusive Peavey 200 Multimedia Speakers.

This Special Edition Aldus Photo Styler Software lets you retouch photos, create images and make composites and color separations.

THE DELL DIMENSION™ XPS 466V SYSTEM

$3,397

(other systems featured are not pictured)

PC Computing BEST

intel inside

*†1993 J.D. Power and Associates Desktop Personal Computer Customer Satisfaction Study conducted among business users and based on 1,956 user respondents. **Guarantees available in th 78759-7299. Attention Dimension Guarantees. *Prices valid in U.S. only. Some products and promotions not available in Canada. ‡Business leasing arranged by Leasing Group, Inc. The Int is a trademark of Microsoft Corporation. **Microsoft Windows for Workgroups 3.11 available as a standard choice through 4/30/94 only. Dell disclaims proprietary interest in the marks and names o*

MULTIMEDIA COMPONENTS ALLY WANT.

INTRODUCING THE DELL STATE-OF-THE-ART, FULLY-ASSEMBLED, MULTIMEDIA SYSTEM.

Let's face it. When you buy a fully-assembled multimedia system, you may have to compromise on component quality. To get the system you want, you could run all over town buying everything from the speakers to the CD drive. Not anymore. We did all the work for you. Basically, we hand-picked the best components. Then we engineered them into incredible systems. This from the company ranked highest in customer satisfaction among business users by J.D. Power and Associates†. No wonder these are multimedia systems everyone seems to want.

DELL™

TO ORDER, CALL

800-433-5895

HOURS: MON-FRI 7AM-9PM CT SAT 10AM-6PM CT SUN 12PM-5PM CT

IN CANADA*, CALL 800-668-3021. KEYCODE # 118KU

Pictured System:

DELL DIMENSION XPS 466V i486™ DX2 66MHz SYSTEM

$3,397 Business Lease◊: $125/MO.

• 16MB RAM • 64MB Max RAM • 256KB External Cache • 450MB Hard Drive • Upgradeable to Pentium™ Overdrive™ • 5 16-Bit ISA Expansion Slots Available, 1 on VL-Bus™ • VL #9GXE Video Accelerator Card with Video Control Panel Software • 3MB Video RAM • VS15 Color Monitor (15", 1024 x 768, .28mm, NI) • One Diskette Drive (3.5") • SpaceSaver Keyboard • Multi-Session, Double-Spin CD ROM Drive • Sound Blaster 16 Sound Card • Peavey Speakers • Microphone • MS-DOS® 6.2/Mouse • Microsoft® Windows™ for Workgroups 3.11** (or Windows 3.1) • Sound Effects Library • Special Edition Aldus Photo Styler • Microsoft Home Sampler

Order Code #5000447

DELL DIMENSION 433SV i486 SX 33MHz SYSTEM

$1,799 Business Lease: $67/MO.

• 4MB RAM • 64MB Max RAM • 170MB Hard Drive • Upgradeable to Pentium Overdrive • 4 16-Bit ISA Expansion Slots Available, 2 on VL-Bus • Accelerated Local Bus Video • SVGA 1024I Monitor (14", 1024 x 768, .28mm) • One Diskette Drive (3.5") • SpaceSaver Keyboard • Multi-Session, Double-Spin CD ROM Drive • 16-Bit Sound Card • Peavey Speakers • Microphone • MS-DOS 6.2/Mouse • Microsoft Windows for Workgroups 3.11** (or Windows 3.1) • Multimedia Microsoft Works • Microsoft Bookshelf • Quicken for Windows • Microsoft Encarta • Microsoft Home Sampler

Order Code #5000448

DELL DIMENSION XPS 450V i486 DX2 50MHz SYSTEM

$2,799 Business Lease: $104/MO.

• 8MB RAM • 64MB Max RAM • 340MB Hard Drive • 256KB External Cache • Upgradeable to Pentium Overdrive • 5 16-Bit ISA Expansion Slots Available, 1 on VL-Bus • VL #9GXE Video Accelerator Card with Video Control Panel Software • 1MB Video RAM • VS15 Color Monitor (15", 1024 x 768, .28mm, NI) • One Diskette Drive (3.5") • SpaceSaver Keyboard • Multi-Session, Double-Spin CD ROM Drive • Sound Blaster 16 Sound Card • Peavey Speakers • Microphone • MS-DOS 6.2/Mouse • Microsoft Windows for Workgroups 3.11** (or Windows 3.1) • Sound Effects Library • Special Edition Aldus Photo Styler • Microsoft Home Sampler

Order Code #5000449

DELL DIMENSION XPS P60 PENTIUM 60MHz SYSTEM

$3,849 Business Lease: $139/MO.

• 16MB RAM • 128MB Max RAM • 528MB Hard Drive • 256KB External Cache • 5 Expansion Slots Available (3 16-Bit ISA, 1 PCI, 1 PCI/ISA Shared) • PCI #9GXE Video Accelerator Card with Video Control Panel Software • 1MB Video RAM • VS15 Color Monitor (15", 1024 x 768, .28mm, NI) • One Diskette Drive (3.5") • SpaceSaver Keyboard • Multi-Session, Double-Spin CD ROM Drive • Sound Blaster 16 Sound Card • Peavey Speakers • Microphone • MS-DOS 6.2/Mouse • Microsoft Windows for Workgroups 3.11** (or Windows 3.1)

Order Code #5000450

USA only for registered owners of Dell Dimension systems purchased after 8/1/93. For a complete copy, please call our TechFax℠ line at 1-800-950-1329 or write Dell USA L.P., 9505 Arboretum Blvd., Austin, TX

Inside logo is a registered trademark and i486, Pentium and Overdrive are trademarks of Intel Corporation. VL-Bus is a trademark of Video Electronics Standards Association. MS-DOS and Microsoft are registered trademarks and Windows others. ©1994 Dell Computer Corporation. All rights reserved.

A FILE MANAGER PROBLEM

TIP While using File Manager in Windows 3.1, I came across a peculiar problem that I'd like to bring to your attention. I put a write-protected 5.25-inch disk in my A: drive and used the COPY command to copy a .BAT file from hard disk to drive A:. Instead of telling me that the disk in drive A: was write-protected, File Manager reported that it copied the file. But actually no file was copied.

When I tried copying a .COM file in the same way, File Manager worked perfectly, warning me that the disk was write-protected. Disaster occurred when I tried to MOVE a .BAT file from drive C: to a write-protected disk in drive A:. File Manager "copied" the file and deleted it from the hard disk. The file was not actually copied to the floppy disk, and it was lost from the hard disk as well. I had to use the UNDELETE command to recover the file on the hard disk. The commands work perfectly well in Windows 3.0. I tried the same experiment on various computers, with similar results. Can you suggest a solution?

S. Sekar
Wakrah, Doha, Qatar

PC MAGAZINE: Microsoft confirms that this is a known problem with the Windows 3.1 File Manager. It's not specific to .BAT files, though, but rather to files under 512 bytes in size. If you attempt to copy or move a file smaller than 512 bytes to a write-protected floppy disk, File Manager will not report any problem but naturally will not copy the file. The .COM file you tested probably was larger than 512 bytes in size and that's why you got the warning message.

Unfortunately, the only solution to this problem is to avoid it. When you copy files to a floppy disk, look at the directory of the disk afterward to make sure that the copied files appear. Before using the MOVE command, try to copy any file larger than 512 bytes to the floppy disk. If File Manager doesn't report that the disk is write-protected, you can safely move or copy files to it.

—Neil J. Rubenking

Our Advisors

Douglas Boling is a contributing editor and the author of many utilities, including MBOOT.COM and EMS40.SYS.
Frank J. Derfler, Jr., is senior networking editor and the author of the *PC Magazine Guide to Connectivity.*
Alfred Poor is a contributing editor and the author of *New Life for Old PCs.*
Jeff Prosise is a contributing editor and the author of the *PC Magazine Guide to DOS 5 Memory Management.*
Sal Ricciardi is a contributing editor and the author of the recent *Running FoxPro* books from Microsoft Press.
Neil Rubenking is technical editor and author of *Can Do DOS, Can Do Windows,* and *PC Magazine Batch File Lab Notes.*
Joe Salemi is a contributing editor and the author of the *PC Magazine Guide to Client/Server Databases.*
Luisa Simone is a contributing editor and the author of the book *Microsoft Publisher.*
Craig Stinson is a contributing editor and coauthor of *Running Windows 3.1* and *Running Microsoft Excel.*
M. David Stone is a contributing editor and coauthor of *Word for Windows Companion,* Second Edition.
Ethan Winer is a contributing editor and the author of *PC Magazine BASIC Techniques and Utilities.*

HOW TO CONTACT US

Do you have a hardware, software, or systems problem you can't solve? Maybe you'd like a better understanding of how something works. If so, we invite your questions. Our experts can give you practical solutions to your problems, provide techniques for using your software and hardware more productively, and help you grasp computer concepts and understand the latest technology.

Do you have a solution to a problem or a tip you think other readers could use? For any tip we print, you'll receive $50 plus a *PC Magazine* T-shirt. We regret that we cannot answer letters individually.

It's easy to contact us. Just send us your submission (use ASCII format for text files) via the medium that's most convenient for you:

U.S. Mail: Solutions, *PC Magazine,* One Park Ave., New York, NY 10016-5802. (Please send a floppy disk along with a printout.)
Fax: 212-503-5799.
MCI Mail: Solutions, 556-3896.
CompuServe Mail: 72241,104.
PC MagNet: Select Submissions to PC Magazine from the main PC MagNet menu. Upload your file to the most appropriate library. If at any time you need help, simply type a question mark (?) and hit Enter; a list of commands will be displayed. If you are not already a member of PC MagNet but would like to join, follow the instructions on page 12 to find your local access number.
CompuServe Members: If you're a CompuServe member, you can join PC MagNet by typing GO PCMAG at any CIS prompt.

AN AUTOEXEC.BAT FOR A WINDOWS DOS BOX

TIP The DOS prompt that you get when you shell out to a DOS box in Windows 3.1 is annoying because it doesn't have an AUTOEXEC-like initialization facility. The Windows manual does not document the availability of such a routine. Nevertheless, I have found a very simple solution that involves editing DOSPRMPT.PIF and creating a new batch file—WINAUTO.BAT—to contain the initialization commands.

After loading DOSPRMPT.PIF into the PIF Editor, the only change required to the default configuration is inserting the command `/C WINAUTO.BAT` into the Optional Parameters field. This causes COMMAND.COM to execute WINAUTO.BAT when the PIF is invoked. Figure 1 shows a sample WINAUTO.BAT.

Note that the last command in WINAUTO.BAT *must* be `%COMSPEC%`. This environment variable contains the full pathname for COMMAND.COM. Otherwise, you will only succeed in executing WINAUTO, and then you will immediately return to Windows. Executing `%COMSPEC%` drops you into a secondary DOS session that doesn't end until you

WINAUTO.BAT
Complete Listing

```
@ECHO OFF
PROMPT Windows DOS Box$_$p$g
DOSKEY
%COMSPEC%
```

Figure 1: **WINAUTO.BAT functions as an AUTOEXEC for a Windows DOS box; this example sets a special prompt and loads DOSKEY.**

type EXIT. WINAUTO.BAT can execute any programs or DOS commands in order to prepare your environment for you.

Kenny Hew
Wellington, New Zealand

▶PC MAGAZINE: You can use this tip even if you're still running Windows 3.0. Highlight the DOS Prompt icon, and then select Properties from the File menu. The standard command line for this icon is simply COMMAND.COM. Append `/C WINAUTO.BAT` to this line, and you'll get the same effect as editing the PIF in Windows 3.1.

Needless to say, that extra copy of COMMAND.COM does take up space in RAM. If you're running DOS 6.*x*, you can be more thrifty with your valuable memory. Instead of the familiar /C switch, which tells COMMAND.COM to execute the command that follows and then to terminate, you can use the new /K switch. This switch works in the same way as the /C switch, but COMMAND.COM does *not* terminate after executing the specified command. DOS 6.0 users can delete the `%COMSPEC%` line from the end of WINAUTO.BAT and use `/K WINAUTO.BAT` in the PIF in order to save 2 or 3 kilobytes of memory that would otherwise be wasted.

—Neil J. Rubenking

Word Processing

HELPING CD-ROM WINWORD FIND ITS HELP FILES

The installation routine for the CD-ROM version of Microsoft Word for Windows 2.0 that comes with Bookshelf puts most of the WinWord files on your hard disk. The help files remain on the CD-ROM, however, and this creates an annoying problem.

Every time you start WinWord, the program looks to the CD-ROM drive for the WinWord and Bookshelf CD-ROM. If it doesn't find the disk—as will often happen if you use other CD-ROMs—you'll get the message that WinWord cannot use the TOOLS-PATH specified in WIN.INI, because it's not valid. To add insult to injury, even if you then insert the CD-ROM, WinWord still won't find the help files when you choose Help. You have to exit and reload WinWord before

SOFTWARE ■ PERIPHERALS ■ SYSTEMS ■ COMPONENTS ■ TOLL-FREE ■ ADVICE ■
SPEED ■ SERVICE ■ SUPPORT ■ VALUE ■ QUALITY

PC DIRECT

Premier Superstores
Top Direct Marketers
Manufacturers of
Systems, Software,
and Peripherals

If it's sold direct,
you'll find it here.

INDEX

SYSTEMS

AMS. 372
Comtrade 388
COMPUTER DISCOUNT WAREHOUSE 437
Dell Computer Systems....334
Expo Tech 346, 350
Inmac....376
Insight Distribution Network....392
Midwest Micro Peripherals....379
PCs Compleat....358
USA Flex....366

SOFTWARE/PERIPHERALS/ COMPONENTS

Amdek....365
Arlington Computer Products....385
Bulldog Computer Products....398
Computability....340
COMPUTER DISCOUNT WAREHOUSE 437
DEE ONE SYSTEMS 384
Dustin Discount Software 339
First Source International....373
Global Horizons, Inc.....399
H. Co Memory Upgrades....397
Kenosha Computer Center 378
LA Trade....403
Megahaus 396
Memory Direct 400
Midwest Computer Works 390
Network Express 401
PC Connection 343
Pinnacle Micro 347
S.A.G./Storage Solutions....402
Software Spectrum 349
Valueline 357

SOFTWARE ■ PERIPHERALS ■ SYSTEMS ■ COMPONENTS ■ TOLL-FREE ■ ADVICE ■
SPEED ■ SERVICE ■ SUPPORT ■ VALUE ■ QUALITY

you can use the help system.

Is there any way to tell WinWord not to look for the help files when it loads or to tell it to take another look at the CD-ROM after you've inserted the disk?

Julie McCollum
Rosemont, Pennsylvania

▶PC MAGAZINE: Having had this trouble on my own machine, I'll add another problem to Ms. McCollum's list. By keeping the help files on CD-ROM, you're stuck with the long CD-ROM access time whenever you ask for help. That seems counterproductive, to say the least.

Fortunately, you can solve these problems by copying the help files—WINWORD.HLP and WINWORD.IND—to your hard disk. Both files are in the WinWord directory on the CD-ROM, and you can copy them to the WinWord program directory on your hard disk with either the DOS COPY command or File Manager's File›Copy command.

To make sure WinWord will look for the files on the hard disk rather than the CD-ROM, you simply delete the TOOLS-PATH line from the WIN.INI file in your Windows directory. Any text editor (including WinWord) will open the file. Then, in the section labeled [Microsoft Word 2.0], delete the line starting with TOOLS-PATH and save the file as ASCII text.

The help files will now always be available to WinWord. Moreover, you'll get help a lot quicker, because WinWord will be reading the files from the hard disk. Now if you load WinWord without putting the WinWord and Bookshelf disk in the CD-ROM drive, you won't see any warning messages.

The one drawback to this technique is that the two help files WINWORD.HLP and WINWORD.IND require roughly 5.7MB of disk space. If that's more than you can spare—or if you prefer the standard WinWord help file to the User's Guide that comes with WinWord and Bookshelf—you can save nearly 4MB of disk space by copying the standard help file to your hard disk instead. That file is stored in the WinWord directory on the CD-ROM as WORDHELP.BAK. In order to use WORDHELP.BAK as your help file, all you have to do is copy it to the WinWord program directory on your hard disk as WINWORD.HLP.

As with the User's Guide files, if you remove the TOOLS-PATH statement from your WIN.INI file, WinWord will always use the help file on the hard disk. If you use the standard help file rather than the User's Guide files, however, you may want to leave the TOOLS-PATH statement alone.

If you leave the statement in WIN.INI, then when you load WinWord, the program will look for the WinWord directory on the CD-ROM drive. If it finds the directory, it will use the User's Guide files on the CD-ROM when you ask for help. If it doesn't find the directory, it will show the warning that the TOOLS-PATH isn't valid and will use the standard help file in the WinWord program directory on the hard disk when you ask for help.

This can be useful if you prefer using the User's Guide files and don't mind the slow speed of reading from the CD-ROM drive but still want to make sure there's help available even if you forget to insert the CD-ROM before loading the program. And in any case, you can recover easily without leaving WinWord and reloading it. Simply choose OK in response to the message that Windows could not find the Bookshelf file, then insert the CD-ROM and give the command for Bookshelf again.—*M. David Stone*

Spreadsheets

END OF THE LINE

❓ I want to use Lotus 1-2-3, Release 3.1, to calculate the severance and accrued-vacation pay for employees leaving our firm. The severance pay is one week for every full year of service. The accrued vacation is figured out by multiplying a full year's vacation period by 1/12 for each month between the anniversary date of hire and the termination date.

For example, an employee hired on July 15, 1987, and then terminated on October 1, 1993, would receive six weeks of severance pay in addition to 2/12 of his yearly vacation compensation—1/12 for the period from July 15 to August 15 and 1/12 for the period from August 15 to September 15.

To calculate the number of full years of service, I use the formula

```
@YEAR(SEVDATE-HIREDATE)
```

where SEVDATE and HIREDATE are names assigned to the cells holding the severance and hire dates. This formula seems to work, but I'm having trouble with the rest of the worksheet. To determine the amount of vacation pay due the severed employee, I need to calculate the number of full months between the employee's most recent anniversary date and his severance date. What formula should I use for this?

Dan Zenczak
Charlotte, North Carolina

▶PC MAGAZINE: Because Lotus 1-2-3's serial date values represent the number of days that have passed since a certain reference point (the beginning of the century), figuring the interval between two dates as a number of days is easy. Simply subtract one serial date value from the other serial date value. On the other hand, resolving a differential expressed in days into other calendar units is quite awkward, since the day-to-month conversion factor varies from month to month. Even converting days into years is complicated by the periodic arrival of leap years.

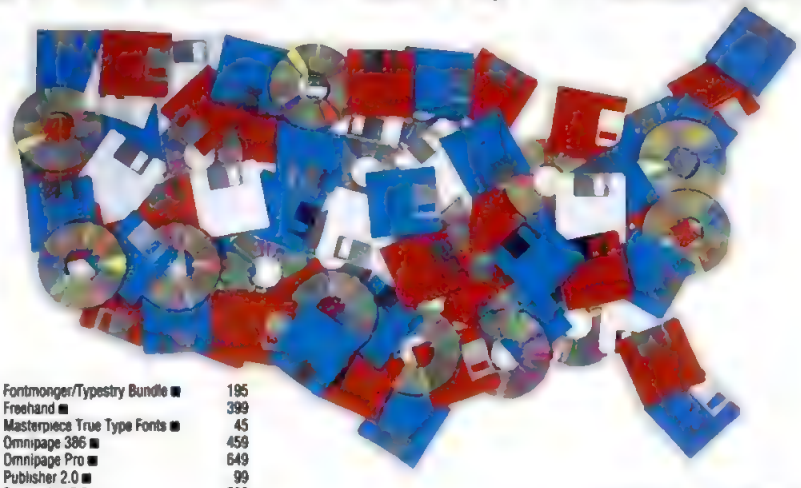
The easiest solution to this problem might be to switch from Release 3.1 to Release 4 for Windows. Release 4 includes @DATEDIF, a new calendar function that makes interval calculation a snap.

@DATEDIF takes three arguments—a starting date, an ending date, and a format string. The third argument tells 1-2-3 how you want the date differential expressed. To get the difference as a whole number of years, ignoring any remainder, you use `"y"` as your format argument. To get the difference as a whole number of months, ignoring both the year component and any fractional remainder, use `"ym"`.

Thus, with @DATEDIF you can calculate the number of whole years between SEVDATE and HIREDATE with the formula

DUSTIN DELIVERS HERE. FREE!

DOS ●
WINDOWS ■
MPC ✚
O/S2 ◆
MAC ▲
HARDWARE ★



ACCOUNTING & FINANCE
CA BPI Accounting 2 ●	159
In The Black ■	85
MS Money ●■	25
One Write + 4.0 ●	49
Peachtree Accounting Release 2 ■	125
Peachtree Complete 7.0 ●	195
Quicken 7.0 ●	49
Quicken 3.0 ■	49
Simply Accounting ●■	79
Stagesoft Accounting ●	99
Turbo Tax ●■	CALL

BUSINESS GRAPHICS
Action Comp. Upgrade ■▲	99
Action ■	209
Actıon ▲	349
allClear ●■	195
CA Cricket Paint ■	99
CA Cricket Presents ■	99
Flowcharting III ●	145
Freelance Graphics ●■	CALL
Freelance Graphics Upgrade ●■	109
Harvard Graphics 3.0 ■	275
Harvard Graphics 3.0 Upgrade ■	95
Informs ■	CALL
Powerpoint ■	325
Powerpoint Upgrade ■	135
Stanford Chart ■	65
Stanford Graph ■	369
Visio 2.0 ■	129
Visio Home ■	85
WP Presentation ●	309

CAD & DRAFTING
Autosketch ●■	CALL
Design CAD 3D ●	259
Draflx CAD ■	259
Design CAD 2-D ●■	185
Generic CAD ●	299
Turbo Cad ■	85

COMMUNICATIONS & NETWORKING
Commworks ●■	139
Crosstalk 2.0 ■	129
Crossfax ■	CALL
Desk To Desk ●	CALL
Eclipse Fax ■	75
Hyperaccess 5 ●	69
Laplink Pro 5.0 ●	119
Netware ●■★	CALL
PC Anywhere Host/Rmt ●	125
Procomm Plus ●	79
Procomm Plus ■	99
Q-Modem ●	69
Reachout ■	CALL
Remote Power On/Off ★	129
Winfax Pro Network ■	265
Wildcat BBS ●	89
Winfax Pro ■	89

DATABASE & DEVELOPMENT
Access ■	CALL
Approach ■	109
CA Clipper 5.2 ●	499
CA Clipper 5.2 Comp. Upgr. ●	149
CA dBFast ■	195
dBase IV ●	469
FileMaker Pro ■	135
Foxpro 2.5 Upgrade ●■	199
Foxpro 2.5 ●■	329
Paradox ●	549
Paradox ■	155
Q & A 4.0 ●	265
Q & A 4.0 ■	175
Rbase ●	495
Superbase ■	CALL

DESKTOP PUBLISHING & FONTS
Express Publisher ●■	109
Facelift For WP ●	75
Facelift ■	69
Fontmonger ■	99
Fontmonger/Typestry Bundle ■	195
Freehand ■	399
Masterpiece True Type Fonts ■	45
Omnipage 386 ■	459
Omnipage Pro ■	649
Publisher 2.0 ■	99
Pagemaker 5.0 ■	599
Printshop Deluxe ●	55
Type Align ■	69
Typestry ■	175

EDUCATION & TRAINING
Auto Insight ●■	55
Automap ●■	65
Autoworks ●	47
Body Insight ●■	55
Body Works 3.0 ●■	39
Complaints Desk ●	99
Computer Works ●	25
Green Explorer ●	49
Holy Bible ●	35
Kid's Desk ●	35
Orbits ●	35
PharmAssist ●	47
Places to Play ●	45
Resume 2.0 ●	CALL
Sales and Marketing Success ●	59
Sportsworks ●	35
Success Inc. ●	65
Typing Tutor VI ●■	39
UFO ●	35
Where Is Carmen-World Deluxe ●	55

GAMES & ENTERTAINMENT
Alone In The Dark ●	45
Capitalist Pig ■	45
Commanchee Overkill ●	35
Falcon 3.0 ●	55
Flight Simulator 5.0 ●	49
Links PRO 386 ●	49
Manhole ●	39
Playmaker Football ●	25
Rodney ●	39
Simcity ●■	CALL
Thrustmaster ★	79

GRAPHICS & CLIPART
Click Art ●■	CALL
Canvas ■	285
Corel Draw 3 ■	139
Corel Draw 4 ■	395
Corel Draw 4 Version Upgrade ■	239
Corel Ventura ■	179
Designer ■	489
Harvard Draw ●■	189
Hijaak ●	105
Hijaak Pro ■	89
Illustrator 4.0 ■	459
Painter ■	275
Photoshop ■	589
Picture Publisher ■	449
Presentation Task Force ●■	129

INFORMATION & PROJECT MANAGEMENT
Act! ■●	275
Ascend ■	145
Commence 2.0 ■	265
Descriptions Write Now ●	95
French Assistant 5.0 ●	65
German Assistant 5.0 ●	65
Italian Assistant 5.0 ●	65
Lotus Organizer ■	109
Manage Pro 2.0 ■	225
Organize Your Way ■	89
Packrat 5.0 ■	255
Policies Write Now ●	125
Power Translator (French) ●	155
Power Translator (Spanish) ●	155
Project ●	329
Project ■	455
Sharkware ■	95
Spanish Assistant 5.0 ●	65
Timeline 5.0 ●■	475

INTEGRATED
MS Office Professional ■	CALL
MS Office Standard ■	489
MS Office Upgrade ■	CALL
Simply Business Bundle ■	425
Smart Suite ■	CALL

MATHEMATICAL
Derive 2.5 ●	155
Mathematica DOS Enhanced ●	735
Mathematica DOS Standard ●	489
Mathematica Windows Enhanced ■	819
Mathematica Windows Standard ■	489

MODEMS
Hayes Accura 14.4 Ext. ★	245
Hayes Accura 14.4 Int. ★	219
PM14400FX Send/Rec Fax ★	225
Sportster 14.4 Int. ★	199
Sportster 9600 ★	CALL
WorldPort 9600 ★	419

OPERATING SYSTEMS
MS DOS 6.2 Upgrade ●	59
Windows 3.1 ■	99
Windows 3.1 Upgrade ■	59
Windows NT ■	CALL
Windows for Workgroups ●	CALL

PERIPHERALS & ACCESSORIES
Cyberman ★	89
Easy Touch Scanman ★	235
Mouseman Serial ★	79
MS Mouse ★	85
Trackman Serial ★	59

PROGRAMMING
Quick Basic ●▲	135
SPF/PC ●▲	195
Turbo C++ 3.0 ●	75
Turbo C++ ■	109
Turbo Pascal 7.0 ●	115
Visual Basic ●■	139
Visual C++ Standard ■	139
Visual C++ Professional ■	329

SPREADSHEETS
123 v4.0 ■	329
123 v4.0 Upgrade ■	109
CA Complete ■	CALL
Excel Comp.& Version Upgrade ■	109
Excel 5.0 ■	315
Improv 2.1 ■	339
Quatro Pro 5.0 ●■	55

UTILITIES
[illegible] Max ●	69
After Dark ●■	35
Any View ■	49
Carbon Copy ●■	139
Corel SCSI ●■	75
Direct Access ●■	CALL
Doubletools for Doublespace ●■	69
Easy Manu 5.0 ■	CALL
Eclipse Find ■	45
Fantastic Recall ■	39
Mac in Dos ●■	CALL
Norton Antivirus ●■	95
Norton Desktop ●■	125
Norton Utilities 7.0 ●	125
PC Tools Deluxe 8.0 ●■	99
PC Weatherman ●■	35
Perfected ●	49
PK Zip ●	49
QEMM 386 ●	69
Ready Aim File ■	89
Spacemanager ●■	35
Spinrite 3.1 ●	89
Stacker 3.1 ●■	99
Star Trek Screen Saver ■	39
Super PC Kwik ●	45
Superstor Pro ●■	89
Uninstaller ■	49
Winsleuth Gold ■	65

WORD PROCESSING
401 Great Letters ■	39
Ami Pro v3.01 ■	255
Ami Pro v3.01 Upgrade ■	CALL
By Design for WP ●■	65
LetterPerfect ●	99
MS Word 6.0 ●	329
MS Word 6.0 ■	319
Perfected! ●	39
WordPerfect 6.0 ●■	299
WordPerfect Upgrade 6.0 ●■	CALL

DUSTIN DISCOUNT SOFTWARE

Plain Wrap Prices, Black Tie Service.

20969 Ventura Blvd., Woodland Hills, CA 91364 (818) 716-9174

Call Toll Free To Order
1-800-765-6214
Fax Your Order 24-hours
1-818-884-5310

CD-ROM SOFTWARE

BUSINESS SOFTWARE
9 Digit Zip Code Directory ●	35
Corel Draw 3.0 ■	139
Corel Draw 4.0 ■◆	395
Direct Phone ●■	99
Global Explorer ■	99
Phone Disk USA ●	59
Select Phone ●■	179
Street Atlas USA ■	99

CLIPART & GRAPHICS
Corel Clip Art ■▲	CALL
Publisher's Paradise ●■	35

EDUCATION & TRAINING
Animals ◆	55
History of the World ■◆	55
Mavis Beacon Teaches Typing ●◆	39
Monarch Notes ●▲	49

ENCYCLOPEDIAS
Grolier's MM Ency. Upgrade ●■	99
Grolier's MM Encyclopedia ●■	199

ENTERTAINMENT
20th Century Video Almanac ●	55
Aegis ■◆	59
Critical Path ■◆	55
Dinosaurs ✚	59
Dune ●	59
Hell Cab ●	69
Inca-CD ●	49
King's Quest VI ●	55
Legend of Kyrandia ■	45
Oceans Below ✚	35
Scrabble ■	35
Seventh Guest ●	59
Space Shuttle ●■	35

GENERAL REFERENCE
Auto Insight ●■	CALL
Beatles Hard Days Night ◆	35
Berlitz Spanish or French ◆	109
Body Insight ●■	CALL
Human Calculator ◆	35
JFK Assassination ◆	45
MS Bookshelf 1993 ■	135
Sports Almanac ◆	45
The Animals ■	55
Time Table of History ●	59
U.S. Atlas ◆■	39
UFO ■	39
World Atlas ◆■	39

MUSIC SOFTWARE
MS Beethoven ◆	59
MS Musical Instruments ◆	59
Soundsations ◆	CALL

SHAREWARE & UTILITIES
CD Speedway ■	65
Software Vault: Gold ●■	25

CD-ROM HARDWARE

ACCESSORIES
CD Caddies (6-pack) ★	39
Hello Music ★	275
Reelmagic Card ★	389

CD-ROM DRIVES
NEC CDR 500 3x-i ★	519
NEC CDR 400 3x-p ★	489
Sony Double Speed External ★	299
Sony Double Speed Internal ★	249
Toshiba 3401 External ★	519
Toshiba 3401 Internal ★	429

MULTIMEDIA KITS
Fusion Double CD 16 LX ★	479
Korg Speakers ★	CALL
Memphis Subsystem ★	799
Multimedia Station Pro with NEC 3X Drive ★	799
Multimedia Station Pro with Sony Double Speed Drive ★	449
Multimedia Station Pro with Toshiba 3401 Drive ★	679
Sound Blaster Kits ★	CALL
WinStorm Kit ★	575
Yamaha Speakers ★	CALL

SOUND CARDS
Pro Audio Spectrum 16 ★	179
Pro Audio Studio 16 ★	235
Sound Blaster 16 ASP ★	235
Sound Blaster 16 ★	179

THE DUSTIN DIFFERENCE

Free Ground Shipping • Same Day Shipping
Overnight Delivery Available • PO's Welcome
Government & Educational Pricing
Visa, MC & AMEX Accepted

We will promptly replace any defective items returned within 30 days, but cannot guarantee compatibility. There is a 15% restocking fee on any non-defective, unopened goods, and all returns must be accompanied by a Returned Merchandise Authorization. Software prices do sometimes fluctuate beyond our control and may change, for better or worse, without notice. While ground shipments are free, we do ask $11 per item for 2-day, $22 per item for overnight, and $5 for C.O.D. Although shipping heavier items may be slightly more, bulk orders can be a lot less. Please call us for any item not listed.

CIRCLE 347 ON READER SERVICE CARD

THE DUSTIN DIFFERENCE

No Credit Card Surcharges
Credit Card Not Charged Until Shipping
Manufacturers' Warranties
Call for Any Items Not Listed

Since 1982

ComputAbility

Consumer Electronics

PMG 3-15 **toll free fax: 800-554-9981**

800-554-9930

Best Buy 1993

WINNER OF EIGHT BEST BUY AWARDS!

COMPUTERS

NEC DESKTOP

486:
Ready 425ES, 486 SX25 4MB/170MB $999
Ready 433ES, 486 SX33 4MB/210MB $1,239
Ready 466ES, 486 DX2/66 4MB/250MB $1,729
Ready Multimedia 433 CD3, 486 SX33 4MB/250MB Triple Speed $1,879

Pentium:
Image Pro 60, No Drive, 8MB, 256K Cache, 2MB VRam $2,925
Image Pro 60, 8MB 30l, 256 Cache, 2MB VRam 250MB / 540MB ..... $3,369 / $3,659

PACKARD BELL

Force 250, 486 SX/33 4MB/245MB $1,049
Force 2010 Multimedia, 486 SX25 4MB/170MB w/ CD ROM $1,229

NOTEBOOK

EPSON

Action Note 4SLC2/50, 4MB/120MB $1,599
Action Note 4SLC2/50, 4MB/170MB $1,799
Action Note 4000 SubNotebook, 4MB 90.0Mb 4MB/80MB / 4MB/120MB ..... $1,349 / $1,409

NEC

Versa E: Enhanced 486SL DX2, 4MB, Active Matrix Color:
40EC, 40MHz, 120MB / 250MB ..... $3,819 / $4,229
50EC, 50MHz, 209MB / 340MB ..... $4,499 / $4,919

TEXAS INSTRUMENTS

TravelMate 4000, 486 SX25 Adv Color 4MB/120MB $2,099
TravelMate 4000, 486 DX2/50 200MB Dual Scan $3,309
TravelMate 4000, 486 DX2/50 Active Color 4MB/200MB $3,799
TravelMate Desktop Intelligent docking System $799
CALL FOR OTHER MODELS!

DAUPHIN

DTR-1, 486 SLC/25 6MB/40MB w/Fax & Ethernet $3,049

PCMCIA

FREE SHIPPING ON ALL PCMCIA!

MODEMS:
ATI Express S/R 14.4 ..... $369
Intel S/R 14.4 ..... $285
Hayes Optima S/R 14.4 ..... $349
AT&T Keep In Touch S/R 14.4 Cellular Comp $349
US Robotics World Port Dual Standard Cellular Fax - Free Delivery $615
Megahertz XJ1144 S/R 14.4 ..... $329
Pilceon S/R 14.4 Cellular Comp. $329
Supra ComCard S/R 14.4 ..... $299
Motorola S/R 14.4 Celect $419

NETWORKING:

XIRCOM
CreditCard Enet 16bit, 10-B2, 10BT $309
CreditCard Enet 16bit Thin $269
CreditCard Enet 16bit, 10BT $269

NATIONAL SEMI CONDUCTOR
InfoMover NE 4100T, 10BT $219
InfoMover NE 4100MC-1 Coax $219

THOMAS CONRAD
TC 5041-T, 10BT $269
TC 5056T Enet 16/32bit, 10BT $279

SOCKET COMMUNICATIONS
10BT Coax Adapter $279
10BT Removable Cable $299
10BT Plus BNC Removable Cable $299
10BT Fixed Cable $299
10BT/Coax Fixed Cable $319

CONTROLLERS:
Adaptec Slim SCSI $289
Socket SR 700 I/O Card $169

TOKEN RING:
Madge Pocket Ring Node 16/4 ..... $629
IBM PCMCIA 16/4 TokenRing $469

MEMORY CARD:
Verbatim SRam 2MB Type2 ..... $349
Verbatim SRam 1MB Type 2 ..... $219

HARD DRIVES:
Maxtor 105MB Type 3 ..... $579

SOUND CARDS:
Turtle Beach Audio Advantage - Free Del $99

PLUG & PLAY

MicroSolutions

No Slot Drive, requires ACI
Backpack CD ROM Double Speed $389
Backpack 250 Tape Drive (Req. min. DOS 3.0) Now with Windows Software $345
Backpack Diskette Drive 1.2, 5.25 (Req. min. DOS 2.0) $175
Backpack Diskette Drive 1.4, 3.5 (Req. min. DOS 2.0) $175
Backpack Hard Drive 340 (Req. min. DOS 3.0) $449

PRINTERS

EPSON

Action Laser Printer 1000 512K ..... CALL
Action Laser Printer 1500 1MB / 2MB ..... CALL
Stylus 800 Ink Jet ..... CALL
Stylus 300 Ink Jet - NEW ..... CALL
Dot Matrix Printers ..... CALL

NEC

Silentwriter M95, 6ppm PS $865
M95fx (M95 w/FAX) $1079
Silentwriter 1097 ..... $1,349
SuperScript 610 ..... $569

Primera

High resolution thermal transfer printing. Great for presentations & overheads $695

OKIDATA

ML320 / ML321 ..... $299 / $419
590 / 591 ..... $419 / $569
395 / 395C ..... $949 / $1,019
810 / 830+ / 850 ..... $809 / $1,079 / $849
400e / 410e ..... $499 / $649

Star

NX-2420 Rainbow $255
NX-2430 Black $205
Star SJ 144 NEW! $469
NX-2450 / NX-2480 ..... $225 / $249

TEXAS INSTRUMENTS

MicroMarc Ink Jet ($30 Rebate) $245*
MicroWriter Basic, 5PPM Laser $509
MicroWriter PS23 5PPM with PS $679
MicroLaser Pro 600 PS23 ($60 Rebate)...$1,269*
*Price reflects rebate - good through 3/31/94

Canon

BJ200E / BJ230 Ink Jet ..... $289 / $385
BJ10SX / BJ 600 Color Ink Jet ..... $239 / $575
LBP 430 Laser $585
LBP 860 Laser $1,379

MODEMS

ZOOM NEW LOWER PRICES!

Free Prodigy Starter Kit with purchase of any Zoom Modem!

V.32 bis Send/Receive 14,400 for DOS or Win
Internal / External ..... $129 / $149
w/ Voice Int/ Ext ..... $149/$175
Zoom 14.4 PKTExternal $225
with Voice $265
V. Fast Class 24.4 bps
VFP 24K Int/ VFX 234 Ext ..... $169/$195
V Fast Class 28.8 Internal $249

Supra Corporation

SupraFaxModem Internal 24/96 NEW! $53
Supra 2400 External $59
SupraFaxModem 144LC, Class 1 only External DOS / Windows $149
SupraFaxModem V.32 bis, Internal with FaxSoftware DOS/Win $135
SupraFaxModem V.32 bis, Ext. alone $189
with Fax Software, DOS/Win $199
with Fax Software Mac $215
Supra Com Card, PCMCIA, 14.4/14.4, S/R, Free Delivery! $299

US Robotics

Sportster 14.4 Int. / with Fax ..... $145 / $149
Sportster 14.4 Ext. / with Fax ..... $159 / $169
Courier V.32 Terbo Int / with Fax ..... $325 / $339
Courier V.32 Terbo Ext / with Fax ..... $375 / $389
World Port Dual Standard Cellular Fax PCMCIA Free Delivery $615

intel

14.4 Fax Modem Int/Ext ..... $159/$189

AT&T

14.4 Fax Modem Int/Ext ..... $149/$185
AT&T Notebook, PCMCIA 14.4 FREE DEL ..$349

TAPE BACK UP

COLORADO MEMORY SYSTEMS INC.

JUMBO - Low Cost Tape Backup
DJ10-120MB $105
DJ20-250MB $165
JUMBO TRAKKER - External Parallel Printer Port Tape Backup System:
JT10(40-120) $289
JT20 (80-250) $315
POWERTAPE SYSTEM:
Includes Colorado Backup for DOS software
2GB Int / Ext, Free Delivery! ..... $945 / $1,029

HARD DRIVES

Seagate

ST-251-1 MFM $239
ST-352A / 3102A IDE ..... $115 / $165
ST-3145A / 3243A IDE ..... $185 / $209
ST-3380N SCSI $385
ST-3290A / 3390A IDE ..... $229 / $279
ST-9145A / 3550A IDE ..... $315 / $379

FREE DELIVERY:
ST-3655A / 3655N ..... $515 / $569
ST-3550N SCSI $529
ST-11200N / 11950N ..... $909 / $1,699
ST-12400N / 12550N ..... $1,619 / $1,699
ST-41651N / 42100N ..... $1,109 / $1,419
ST-42400N / 43400N SCSI ..... $1,729 / $2,129

Maxtor

IDE 7131A / 7245A / 7345A ..$189 / $245 / $299
IDE 7171A / 7213A / 7273A ..$209 / $225 / $335
IDE 7546A - Free Delivery $599
SCSI 7245 / 7345S ..... $255 / $349
SCSI 540SL - Free Delivery $779

CONNER

CFA170A / 340A IDE ..... $199 / $285
CFA170S / 340S SCSI ..... $205 / $305
CP30254 IDE $265
CFS 210A / 420A ..... $229 / $379
CFA1060S SCSI - Free Delivery $939

Quantum

ELS 127 IDE / SCSI ..... $195 / $199
ELS 170 IDE / SCSI ..... $189 / $195
LPS 270 IDE / SCSI ..... $265/$279
540 IDE / SCSI FREE DELIVERY ..... $609/$639
PD 1050 SCSI FREE DELIVERY $929
PD 1225 SCSI FREE DELIVERY $1,049
PD 1800 SCSI FREE DELIVERY $1,329

MICROPOLIS

FREE DELIVERY(contiguous 48 states)
1926 / 1936 SCSI ..... $1,549 / $2,219
2210 / 2217 SCSI ..... $879 / $1,179
2210A / 2217A IDE ..... $879 / $1,179
2210AV / 2217AV ..... $929 / $1,269

WESTERN DIGITAL

Featuring CAVIAR
AC1210/AC2250 ..... $199/$225
AC2340/AC2420 ..... $265/$339
AC2540 ..... $519

CONTROLLERS

adaptec

1522 SCSI Direction Kit: 16 Bit Standard SCSI with Floppy Support & Drivers $135
1522 SCSI Direction PLUS Kit $189
1542CF Single $195
1542CF SCSI Master Kit / PLUS ..... $249/$305
2742 Single NEW $295
2742T Kit NEW $349
2742T Single NEW $325
2842 VL Master Kit $299
Mini Scsi:
T-130/T-160 ..... $65/CALL
T-260/T-336 ..... $155/$95
T-348/T-358 ..... $169/$205
Slim SCSI, APA-460, PCMCIA, Free Del $289

FUTURE DOMAIN

1680 SVP-ISA
TMC-850 MCD CD ROM Kit $55
1680 SVP-ISA, 16 bit SCSI 2 with floppy support & CD ROM SCSI support $129
700 EXSVP-EISA $369

OTHER

Seagate ST-01 SCSI 8 Bit Adaptor $29
Seagate ST-02 SCSI 8 Bit Adapt. w/FD Cont..$45
DTK PTI 227, 2 Serial, 1 parallel, 1 game port, 1 floppy disk controller, 1 embedded hard disk drive adapter $29

CPU UPGRADES

Cyrix

$5 shipping on all CPU upgrades!

Upgrade Chips:
CX 486 DRX2 16/32 ..... $279
CX 486 DRX2 20/40 ..... $319
CX 486 DRX2 25/50 ..... $369
CX 486 SRX2 20/40 ..... $249
CX 486 SRX2 25/50 ..... $279

intel

SX 20 / 25 ..... $309 / $309
DX 25 / 30 ..... $319 / $509

MONITORS

CTX

5439A, 14", .39DP 1024x768, Inter $225
5458A, 14", .28DP 1024x768, Inter $255
1451NI, 14", .28DP 1024x768, NI $269
1560, 15", .28DP 1028x768, NI $395
1561, 15", .28 1024x768, NI $355
1760F, 17" Flat, .31DP, 1280x1024, NI $739

SONY

CPD 1320 UC2, 14", 640 x 480 VGA, ... $335
CPD 1430S, 14", 1024 x 768, NI, 8514A, .25 MM, cables & stand $585
CPD 1730S, 17",1024 x 768, NI, Free Del $1,039
CPD 17SEI, 17", Free Delivery! $1,229

NEC

SVGA 14" 1024x768 NI, .28 mm dot $305
5FGe, 17", .28, 1024x768, 76Hz $1,045
NEW Multi Sync:
4FGe EnergyStar Comp $669
5FGp Optical Surface $1329
3V EnergyStar Compliant $499
6FGp $2,249

NANAO

F3401W / F550i ..... $689 / $995
F550IW / F560IW ..... $1,189 / $1,429

PACKARD BELL

PB8536 SVGA, 14", .39, 1024x768 ..... $249
PB8549 SVGL, 14", .28, 1024x768, NI $339
PB8515 SVGL, 15", .28, 1024x768, NI $429
PB8517 SVGM, 17", .28, 1280x1024, NI $819

SCANNERS

Canon

IX 4015 Color Scanner, SCSI with Interface Includes Ofoto software $999

RELISYS

AVEC 3 Pass, Flatbed, Color Scanners
1200 PC/2400 PC/4800 PC ..... $599/$799/$969
Reli Single Pass, Flatbed, Color Scanners
2400 PC / 9600 PC ..... $1379 / $2779

LOGITECH

Scanman 256 (gray scale) $165
Scanman 256 with Omni Page Direct $209
Scanman Color with Omni Page Direct $429
FotoMan Plus $529
Scanman Easy Touch $215

EPSON

ActionScanning System PC ..... CALL
ES-800C Bundle ..... CALL
ES-800C Professional PC Bundle ..... CALL

Mustek

ScanMagic 400 dpi Handheld 256 ga / Color Handheld ..... $115 / $229
GrayArtist Handheld, 800 dpi $149
PrinScan 105, Handheld, 400 dpi $185
ColorArtist Pro Handheld 800 dpi $349
Paragon 600 Flatbed FREE DEL $839

POWER SUPPLY

PC POWER LITE

THE POWER PEOPLE

Smart 400 / 500 / 600 ..... $279 / $309 / $335
Smart 750 / 900 / 1250 ..... $429 / $529 / $659

BC Series Standby UPS Systems
BC 250: 250 VA, 2 outlet $95
BC 400: 400 VA, 2 outlet $149
BC 500: 500 VA, 4 outlet $179
BC 400LAN $149
BC 500LAN $189
BC 600LAN $245
BC 750LAN $299
BC 900LAN $345

Omnipower Line Interactive UPS
OMNI 500LAN: 450 VA $249
OMNI 600LAN: 600 VA, ... $295

APC

LOWER PRICES!

Back Ups
250 / 400 ..... $99 / $155
450 / 600 ..... $185 / $255
900 / 1250 ..... $365 / $489

Smart Ups
370 / 400 ..... $309 / $285
600 / 900 ..... $335/$535
1250 ..... $689

NETWORKING

ARTISOFT

AE-2 Ethernet Adapter $179
Node Runner 2000C Adapter $159
Node Runner 2000C Starter DOS/Win $409/$465
Node Runner St2000C Coax / 5 Pk ..... $89/$429
Node Runner St2000T Coax / 5 Pk ..... $89/$429
Z Two Station Kit $81
Artisoft Central Station / II ..... $319/$379
AI Dos/Win ..... $77/$89
Simply LANtastic Internal Add-On Kit $97
Simply LANtastic Software Kit $189
Simply LANtastic Internal Starter Kit $189

3Com

Etherlink II 16 TP 8/16 Bit (503-16TP) $159
Etherlink II/16 8/16 (503-16) $149
Etherlink III Coax $119
Etherlink III TP $119
Etherlink II 8 bit TP $209
CALL FOR 5 PACK PRICING!

SMC

SMC Ethercard Ultra Elite 16C Combo $119
SMC Ethercard Ultra Elit 16T $99
SMC Ethercard Ultra Elite 16 ..... $89
SMC Ethercard Plus Elite 16 ..... $115
SMC Ethercard Plus Elite 16T $115
SMC Ethercard Plus Elite 16 Combo $135
CALL FOR 6 PACK PRICING!

National Semiconductor

Infomover NE2000 CTA-1 ..... $99
Infomover NE2000 C-1 ..... $89
Infomover NE2000 T-1 ..... $79
Infomover NE4100 T-1 ..... $199
Infomover NE4100 C-1 ..... $199
CALL FOR 5 PACK PRICING!

NOVELL / National Semiconductor

Personal Netware Single User1-0 ..... $65
Personal Netware 5 User $259
Personal Netware Starter Kit Coax $239
Personal Netware Add-On $149

intel

Etherexpress 16 Bit Coax $99
Etherexpress 16 Bit Coax 10BT $99
Etherexpress 16 Bit Flash Coax $129
CALL FOR 5 PACK PRICING!

VIDEO BOARDS

DIAMOND

Speedstar Pro, 1MB / VLB ..... $115 / $115
Stealth 1MG $199
Stealth 24, ISA / VLB ..... $155 / $155
Stealth Pro, ISA, 1MB / 2MB ..... $239 / $329
Stealth Pro, VLB 1MB / 2MB ..... $245 / $329
Viper VLB 2MB / PCI 2MB ..... $395 / $409

ATI

VGA Wonder GT Windows Accel $165
ATI Graphics plus 2MB $229
ATI Ultra Pro 2 MB / VLB ..... $394 / $349
ATI Ultra Pro EISA 2MB $375

9GXE, 1230 x 1024 NI, SVGA:
LVL 10, 1MB ISA/VLB ..... $239/$249
LVL 11, 2MB ISA/VLB ..... $349/$349
LVL 12, 3 MB ISA/VLB ..... $429/$429
LVL 14, 4MB $629

Dynamite VL Pro SVGA 1MG/2MG ..... $159/$205
Graphite VL Pro HG SVGA 610/720 ..... $249/$385

FLOPTICAL

VALUE STOR

SUPER 21MB External,Includes 8 bit host adapter and software $379
VALUE STOR 21MB Internal Includes 3.5" drive, 8 bit SCSI host adapter, cable & software $309

FLOPPY DRIVES

Floppy Drives
3.5" without Frame 1.44MB PC/AT $55

TEAC

All Media Floppy
The All-In-One 3.5" & 5.25"
Half Height Internal Floppy Drive $125

TECH INFO: (414) 357-8181 • FAX: 800-554-9981 • HRS (CST): M-F 8am-8pm, Sat 9am-5pm

Since 1982
ComputAbility
Consumer Electronics

COMPUTER SHOPPER Best Buy OF 1993

WINNER OF EIGHT BEST BUY AWARDS

PMS 3-15 **toll free fax: 800-554-9981**

800-554-9930

Since 1982 ComputAbility Consumer Electronics

Exclusive CD ROM Bundles!*

CD ROM Drive & Interface Options	BARE DRIVE	8 Bit SCSI Interface	16 Bit SCSI-2 Interface	Pro Audio Spectrum 16	Pro Audio Studio 16	Sound Blaster SCSI-2	Sound Blaster SCSI-2 ASP	7 Title MPC Bundle
Chinon 535 Int.	$305	$349	$430	$449	$475	$499	$519	add $79
Chinon 535 Ext.	$395	$425	$520	$559	$585	$609	$629	add $79
Mitsumi FX001D	$199 (with Sound Blaster 16 MPC = $358 or 16 MCD ASP = $394)							add $79
NEC 3XI	$469	$529	$594	$613	$639	$663	$683	add $79
NEC 3Xe	$559	$619	$684	$723	$749	$773	$793	add $79
Texel/Plextor 3028I	$295	$355	$420	$439	$465	$489	$509	add $79
Texel/Plextor 5028e	$399	$459	$524	$573	$589	$613	$633	add $79
Toshiba 3401B Int.	$355	$415	$480	$499	$525	$549	$569	add $79
Toshiba 3401E Ext.	$459	$519	$584	$623	$649	$673	$693	add $79
Toshiba 4101 Int. New!	$235	$295	$360	$379	$405	$429	$449	add $79

*Prices good with the Purchase of any CD ROM Drive or Upgrade Kit (at time of purchase only)

***Add $79* Special 7 Title Bundle includes:**

- Toolworks Multimedia Encyclopedia
- Chessmaster 3000
- Mavis Beacon Teaches Typing MPC
- US Atlas MPC
- World Atlas MPC
- Animals MPC
- Mario is Missing MPC

CD-ROM BUNDLE RAMA

Buy 3 for $59* or 5 for $99*

1001 Utilities
Adventures in Heaven
America Premium Shareware
Animals! SanDiego Zoo
Arthur Teaches Trouble
Audubon Birds
Audubon Mammals
Battle Chess
Carmen World Deluxe
Capital Hill
Casino Collection
CD Game Pak II
Chess Master 3000 MM MPC Pro
CIA World Tour
Clip Media II
Clipart Warehouse
Complete Bookshop
Cookbook Heaven
Deathstar Arcade
Dinosaur Adventure
Eco Quest
Encyclopedia of Sound
Game Arena
Garbo
Gardening
Giga Games
Graphic Animation Festival V.1
Graphic Textures
Guiness Book of Records '93 MPC
HAM Radio
Hugo's House of Horrors
Interactive Storytime V. 1 or 2
It's A Wonderful Life
Jokes & Pranks
Kid's Collection
King Quest 5
Kodak Photo CD Access
Loom
Lovin' In The 60's
MacMillans Childrens Dictionary
Magazine Rack
Mario is Missing Deluxe
Mavis Beacon 3.0 MPC
Mayo Clinic for Windows
Mixed up Mother Goose
Monkey Island
Multimedia Audio Collection
National Geographic Mammals
New Basics Electronic Cookbook
Oceans Below MPC
PC Sig 12th Edition
ProPhone Bus. Ed. DOS
Right College by Arko
ROM Material
Secret Weapons of the Luftwaffe
Selectware Jukebox
Software Vault II
Solar System
Sound Effects Library
Space & Astronomy
Space Quest 4
Space Shuttle MPC
Sports Illustrated Almanac
Star Wars Chess MPC
Time Table of History: Sience & Innovation
Too Many Typefaces
Toolworks Ref Library
US Atlas V 4 w/ Video MPC
US Atlas with Automap
US Presidents
Wave Pool
Window Ware
Wing Commander/Ultima VI
World Atlas V.4 w/ Video MPC

Accessories to add to your Bundle (Each counts as one title)

CD Caddy 4 Pack
Portable CD Case holds 10 ea.
CD Cleaning System
CD Lens Cleaning System
Digital Headphones

***With the purchase of any CD-ROM Drive or Upgrade Kit from ComputAbility buy 3 for $59 or 5 for $99**

*Offer good at time of purchase only!

SPEAKERS

LOWERPRICES!

AC-3 NEW! ..... CALL
ACS-50 / 150 ..... $75 / $109
ACS-100 / 300 ..... $129 / $269

YAMAHA

Yamaha Digital Speakers (YSTM10H) $99

ACOUSTIC RESEARCH

AR Partner 22 Black/42 Gray ..... $75/$149
AR Partner 570 Gray/822 Gray ..... $279/$219

MISC. MM

ADS
VGA TV Elite Int / Ext ..... $189 / $235
TV Elite A/V NEW! $249
Video Clipper / PC Prime Time ..... $315 / $325
Game Blaster $85

CREATIVE LABS
WAVE Blaster $179
Video Blaster for Windows $325
Video Spigot $239
TV Coder $149

SIGMA DESIGNS
Real Magic / SCSI Version ..... $379 / $429
Win Storm $185
Real Magic CD ROM Kit $789

TURTLE BEACH
Maui wavetable synthesizer upgrade $159
Wave/Turtle Tools Bundle $94.95
Tahiti $259
Rio $139

CD-ROM BUNDLES

CREATIVE New!

Omni CD Internal Double Speed ..... CALL
Digital Edge Multimedia Kit ..... CALL
Discovery/Edutainment ..... CALL

MEDIA VISION

Pro 16 Multimedia System III, FREE DEL $579
Fusion Double CD 16, NEW FOR '93! $499
Media Vision Memphis Ext. FREE DEL $779

TURTLE BEACH

MultiSound Bonanza
w/ NEC 3XI FREE DEL $1299
w/Texel 3028 FREE DEL $1025

For Bare Drives See Grid!

SOUND CARDS

CREATIVE New!

Sound Blaster 16 Basic $129
Sound Blaster Deluxe $75
Sound Blaster Pro Deluxe $115
Sound Blaster 16 Multi CD $159
with adv. signal processing $195
Sound Blaster 16 Scsi 2 ..... $179
with adv. signal processing $209

MEDIA VISION

Pro Spectrum 16 Basic $99
Pro Audio Spectrum 16 ..... $112
Pro Audio Studio 16 ..... $155

TURTLE BEACH

Audio Advantage PCMCIA Free Del $99
MultiSound Monterey $349
Maui Wavetable Synthesizer Upgrade $159
Wave for Windows $74.95
(w/ purchase of any Sound Card) $39

OTHER

Advanced Gravis UltraSound $129
Aztech Labs Sound Galaxy Basic Extra:
16 bit, SCSI Inter w/ Roland Sound $169
Logitech SoundMan 16 ..... $105
MS Sound System 2.0 w/ board $179
Diamond Sonic Sound $215
Calypso Audio Magician Plus NEW! $79
DigiSpeech Portable Sound+ $145
Roland SC-7 Sound Canvas Module $319
RAP-10 Roland Audio Prod. Free Del $489
Orchid Soundwave 32 ..... $219

P.O. Box 17882
Milw, WI 53217

- **One of Wisconsin's Top 10 Women OwnedBusinesses.**
- **Corporate, Government & School POs Welcome.**
- VISA
- **No Surcharge on Credit Cards.**
- **Most Orders Shipped within 48 Hours.**
- **Software Shipping only $5 per order, not per title. Hardware: 5% - Min. $5.**
- **C.O.D orders welcome, with only a $6.00 Charge.**
- **We Ship Latest Version of Software Available.**
- **All Products Sold Carry Manufacturers' Full Warranties & Documentation.**
- **APO, FPO HI, AK Puerto Rico & Canadian orders welcome: 6% - Min. $6. International Orders Shipped First Class Mail Insured:15% - Min. $15. If mail cost exceeds calculated amount, you'll be billed additional. Note: UPS to AK or HI may run more than 6%. If so, you will be billed additional.**
- **Call for Free Catalog & Items Not Listed**

Personal & company checks allow 14 working days to clear. Prices fluctuate beyond our control & may change for better or worse. Not responsible for typographical errors. Defective returns must have a Return Authorization number. Call our 1-800# to obtain a Return Authorization or your return will not be accepted. Shipping & handling are non-refundable. All sales are final. All returns are subject to a restocking fee.

*Free delivery applies only to the contiguous 48 states

Where the Top 50 Software Titles are Always on Super Sale!

1.MS DOS 6.2 ..... 49.95	14.MS Power Point 4.0 for Windows 304.95	27.Corel Draw 3.0 for Windows 124.95	40.MS Works 3.0 Win (special intro price) 74.95
2.WordPerfect 6.0 DOS 284.95	15.Disney Screen Saver for Win 28.95	28.PrintShop Deluxe V 1.2 for Win 46.95	41.MS Encarta '94 CD while supplies last 89
3.Lotus 123 Release 4 for Windows 294.95	16.After Dark for Windows V 2.0 ..... 29.95	29.ViSio 2.0 for Windows 119.95	42.MS Windows NT 3.1 ..... 299.95
4.MS Excel 5.0 for Windows 304.95	17.MS Office 4.0 for Windows 459.95	30.Paradox 4.5 ..... 519.95	43.Quicken Companion 2 ..... 24.95
5.MS Access 1.1 ..... 299.95	18.Procomm Plus 1.02 for Windows 93.95	31.Quicken 3.0 for Windows 41.95	44.Lotus Improv 2.1 for Windows 304.95
6.MS Windows 3.1 ..... 88.95	19.WordPerfect for 6.0 Windows 284.95	32.MS Scenes: Sierra Club 24.95	45.MS Windows for Workgroups 3.11 ..... 137.95
7.Paradox 4.5 for Windows 136.95	20.Corel Draw 4.0 for Windows 374.95	33.MS Flight Simulator 5.0 ..... 43.95	46.Stacker 3.1 ..... 91.95
8.Quattro Pro 5.0 for Windows 42.95	21.Norton Utilities 7.0 ..... 111.95	34.Quicken 7.0 for DOS 42.95	47.Lantastic AI 5.0 Win/DOS 77.95
9.MS Publisher 2.0 for Windows 122.95	22.PC Anywhere V 4.5 Host & Remote 112.95	35.Turbotax 93 Headstart for DOS/Win 41.95	48.Quark Xpress for Windows 544.95
10.Qemm 7 ..... 82.95	23.MS Scenes: Outer Space 24.95	36.MS Arcade 1.0 for Windows 28.95	49.Compuserve Win Membership 28.95
11.Procomm Plus 2.01 for DOS 88.95	24.Harvard Graphics 2.0 for Windows 249.95	37.Hijack Pro 2.0 Windows 79.95	50.WordPerfect Office 5 User License 239.95
12.MS Word 6.0 for Windows 299.95	25.Quattro Pro 5.0 for DOS 42.95	38.QuickBooks 2.0 ..... 94.95	SEE BELOW
13.WinFax Pro 3.0 for Windows 78.95	26.Saber LAN Workshop 67.95	39.Lotus Organizer 1.1 for Win 91.95	FOR MORE GREAT SOFTWARE TITLES!

SOFTWARE

3dfx To The Max 7.0 w/Move Em 58.95	Design Cad 3D 4.0 ..... 232.95	Painter 2.0 for Windows 259.95	
ACT! 1.1 for Windows 249.95	Direct Access 1.0 Win or 5.1 DOS 82.95	PC Anywhere 1.0 for Windows 124.95	
AskSam 1.0 for Windows 213.95	Eclipse Find for Win (thru 1/31/94) 37.95	PC Tools Pro 9.0 ..... 86.95	
Auto Sketch 2.0 for Windows 204.95	Fax and Find for Windows 154.95	Peachtree 2.0 for Windows 108.95	
AutoCAD LT 1 for Windows 429.95	Form Flow for Windows 122.95	Peachtree Complete 7.0 ..... 178.95	
Back-It 2.0 for Windows 44.95	Harvard Graphics 3.0 for DOS 384.95	Presentation Task Force 4.0 for Win 116.95	
Borland Office 2.0 for Windows 369.95	IBM CAD DOS or OS/2 ..... 95.95	Print Cache 3.1 ..... 46.95	
Borland Super Pack for Windows 182.95	Info Select 2.0 ..... 81.95	Q Modem Pro for Windows 86.95	
CA Clipper V 5.2 ..... 509.95	Lotus 123 3.4 ..... 394.95	Q Modem Pro 1.5 ..... 58.95	
CA Realizer 2.0 for Windows 72.95	Lotus Notes 3.0 Starter 817.95	Quattro Pro WorkGroup Edition 193.95	
Cakewalk Pro for Windows 2.0 ..... 204.95	Mac In Windows 2.0 ..... 88.95	QuickPay Payroll 3.0 Win/DOS 47.95	
Calendar Creator Plus 2.0 Win or 5.0 DOS 39.95	MS Money 2.0 for Windows 28.95	Smalltalk V for DOS 61.95	
Carbon Copy 2.0 Win or 6.1 DOS 128.95	MS Project 3.0 for Windows 424.95	TaxCut Final Start DOS or Win 35.95	
Card Shop Plus 26.95	MS Scenes: Impressionists Collect 24.95	Turbotax 1040 Final for DOS or Win 41.95	
Central Point PC Tools Pro 9.0 ..... 87.95	MS Visual Basic 1.0 for Win Standard 124.95	Uninstaller 44.95	
Check It Pro Analyst for Windows 81.95	MS Visual C++ Professional 1.5 for Win 389.95	Virus Scan DOS or Windows 86.95	
Claris File Maker Pro 2.1 ..... 119.95	NetRoom V 3.0 ..... 59.95	ViSio 2.0 for Windows 119.95	
Claris Works 1.0 for Windows 119.95	Norton Antivirus V 3.0 DOS & Win 82.95	WinProbe for Windows 46.95	
Common Ground for Windows 86.95	Norton Backup 2.2 DOS or 3.0 Win 94.95	WinSleuth Gold Plus 108.95	
Communications Suite for Windows 108.95	Norton Commander 4.0 ..... 82.95	WordPerfect 6.0 & Quattro Pro 5.0 ..... 304.95	
Corel Ventura 4.2 for Windows 159.95	Norton Desktop 3.0 for Windows 112.95	WordPerfect Presentation for Windows 289.95	
Design CAD 2D 7.0 for Windows 169.95	Norton Speed Drive 4.0 for DOS/Windows 63.95	WordPerfect Works 1.0 ..... 82.95	
	OmniScan 1.0 for Windows 289.95	WordScan Plus 2.0 for Windows 414.95	
	One Write Plus Accounting 4.0 ..... 47.95	XY Write for Windows 217.95	
	OS/2 2.0 for Windows 49.95	Your Medical Records 39.95	

UPGRADES

Borland C++ 4.0 Upgrade for Win 169.95	
CA Super Project Comp. & Vers. Upg 108.95	
Corel Draw 4.0 Version Upgrade 216.95	
Harvard Graphics for Windows 2.0 ..... 82.95	
Lotus 123 Rel 4 Competitive/Vers 94.95	
Lotus Freelance for Win Comp Vers Upg 94.95	
Lotus SmartSuite 2.1 for Win Upgrade 284.95	
MS Excel 5.0 for Window Competitive 119.95	
MS Office 4.0 for Win Comp. Upgrade 274.95	
MS Powerpoint for Win Comp Upgrade 119.95	
MS Visual Basic Pro Version Upgrade 94.95	
MS Visual Basic Standar Comp Upg 94.95	
MS Visual C++ Std Version Upgrade 76.95	
MS Windows 3.11 Upgrade 51.95	
MS Word 6.0 Competitive Upg for Win 119.95	
Quattro Pro Workgroup Comp. Upg 96.95	
WordPerfect 6.0 Comp Tradeup for DOS 117.95	
WordPerfect 6.0 Comp Tradeup for Win 114.95	
WordPerfect 6.0 Version Upg DOS 6.0 ..... 99.95	
WordPerfect 6.0 Version Upgrade for Win 99.95	
WordPerfect 6.0/Quattro Pro Comp. Upg 137.95	

TECH INFO: (414) 357-8181 • FAX: 800-554-9981 • HRS (CST): M-F 8am-8pm, Sat 9am-5pm

CIRCLE 300 ON READER SERVICE CARD

SEVPAY.WK1

Complete Listing

A	A	B
1	SevDate	16-Nov-93
2	Hiredate	18-Dec-87
3	YearsOfService	5
4	AccruedVacation	0.83
5		
6	\y	{getnumber "Enter Severance Year: ",SevYear}
7		{getnumber "Enter Severance Month: ",SevMonth}
8		{getnumber "Enter Severance Day: ",SevDay}
9		{getnumber "Enter Hire Year: ",HireYear}
10		{getnumber "Enter Hire Month: ",HireMonth}
11		{getnumber "Enter Hire Day: ",HireDay}
12		{let SevDate,@date(sevyear,sevmonth,sevday)}
13		{let HireDate,@date(hireyear,hiremonth,hireday)}
14		{if HireDay>SevDay}{let SevMonth,SevMonth-1}
15		{if HireMonth>SevMonth}{let SevMonth,SevMonth+12}{let SevYear,SevYear-1}
16		{let YearsOfService,SevYear-HireYear}
17		{let AccruedVacation,(SevMonth-HireMonth)/12}~
18		
19	HireYear	87
20	HireMonth	12
21	HireDay	18
22	SevYear	92
23	SevMonth	22
24	SevDay	16

***Figure 2:* This Lotus 1-2-3 macro provides the basis for determining severance pay based on years of service and accrued-vacation time.**

```
@DATEDIF(HIREDATE,SEVDATE,"y")
```

In order to calculate the number of full months since the employee's most recent anniversary date, you can use the following formula:

```
@DATEDIF(HIREDATE,SEVDATE, "ym")
```

Other format arguments let you see the date interval expressed in other ways.

The newest version of Quattro Pro for Windows also has a function—@MNTHS—that simplifies this kind of calculation. @MNTHS returns the number of whole months between a starting date and an ending date. Thus, to get the number of complete service years for an employee, you can use

```
@INT(@MNTHS(HIREDATE,SEVDATE)/12)
```

The following formula similarly returns the number of whole months that have passed since the employee's most recent anniversary date:

```
@MOD(@MNTHS(HIREDATE,SEVDATE)/12)
```

So much for fully automated solutions. Now let's look at a semiautomated approach—the macros shown in Figures 2 and 3. (You can download both macros from PC MagNet's Utilities/Tips Forum archived as SEVPAY.ZIP.) The macro in Figure 2 works in all versions of 1-2-3. Figure 3 is a user-defined function written in Microsoft Excel 5.0's Visual Basic language. Both macros split the severance and hire dates into year, month, and day components and then subtract the hire components from the corresponding severance components.

To see how the subtraction is done, let's travel back to grade school for a moment and review the steps involved in subtracting one number from another. Suppose you want to solve the following problem:

```
 764
-468
```

You start with the rightmost column, but since you can't take 8 away from 4, you let the 4 borrow from the column to its left. The effect of this borrowing is to increase the 4 to 14, while the 6 is decremented to 5. Put into words, the borrowing changes "seven hundred sixty-four" into "seven hundred fifty-fourteen." The number has the same value after the borrowing as it had before, but the representation has changed. Now you can do the rightmost-column subtraction.

After handling the rightmost column,

SEVPAY.XLS

Complete Listing

```
Option Explicit

Dim HireDate As Date
Dim SevDate As Date
Dim HireYear As Integer
Dim HireMonth As Integer
Dim HireDay As Integer
Dim SevYear As Integer
Dim SevMonth As Integer
Dim SevDay As Integer

Function YearsOfService(SevDate, HireDate)
    Application.Volatile
    HireYear = Year(HireDate)
    HireMonth = Month(HireDate)
    HireDay =
    SevYear =
    SevMonth =
    SevDay = Day(
    If HireDay >
        SevMonth =  - 1
    End If
    If HireMonth > SevMonth Then
        SevYear = SevYear - 1
    End If
    YearsOfService = SevYear - HireYear
End Function


Function AccruedVacation(SevDate, HireDate)
    Application.Volatile
    HireYear = Year(HireDate)
    HireMonth = Month(HireDate)
    HireDay = Day(HireDate)
    SevYear = Year(SevDate)
    SevMonth = Month(SevDate)
    SevDay = Day(SevDate)
    If HireDay > SevDay Then
       SevMonth = SevMonth
    End If
    If HireMonth > SevMonth Then
       SevMonth = SevMonth + 12
    End If
    AccruedVacation = (SevMonth - HireMonth
End Function
```

***Figure 3:* This user-defined function written in Microsoft Excel 5.0's Visual Basic language also determines severance pay based on years of service and accrued-vacation time. The variable declarations at the top of the module aren't strictly necessary but are regarded as good programming practice.**

Texas Instruments
6441 *TravelMate 4000F WinDX2/50 Active Matrix Color Notebook*—6.3 pounds, 200 MB, 16ms IDE Hard Drive, 8.4" Active Matrix Color Display, 4 MB RAM (upgradable to 20 MB), 1.44 MB Floppy, Trackball ..... **$3799.**

Texas Instruments
8934 *TravelMate 4000E WinSX/25 Mono*—486SX 25 MHz, 4 MB *(60ns)* RAM, 8K cache, 10" passive-matrix monochrome VGA with 64 gray scales *(640x480)*, 120 MB drive, full-travel keyboard, TravelPoint pointing device ..... **$1899.**

Texas Instruments
14288 *TravelMate 4000E WinDX2/50 DualScan Color Notebook*—50MHz 486DX2 with coprocessor, 8K cache, 4 MB RAM, 9.4" passive matrix color VGA 640x480, 1 MB VRAM, 200 MB drive, 1.44 MB floppy, Trackball, 6.3 pounds ..... **$3299.**

Aldus
14335 *TouchBase Windows*—Powerful contact management. Stores names, addresses, phone numbers & personalized info. Dials phone automatically & prints envelopes, labels, address books, Rolodex cards & fax cover sheets **$29.95**

Voted Best Mail-Order Company by PC World Readers three years in a row!

PC WORLD WORLD CLASS AWARD

We carry more than 3500 products! If you don't see something listed, just call. Version numbers are current at press time. Products listed in red are Microsoft Windows Applications.

Unless indicated by *(CP)*, all software is not copy-protected.

COMPUTERS

Monitors not included with Systems.

Compaq Computer ... 3 years
9031 ProLinea 4/33S, 120 MB, Win..... $1099.
8984 ProLinea 4/33S, 240 MB, Win..... 1249.
10894 ProLinea 4/50, 240 MB, Win., PFS: WindowWorks, faxmodem..... 1759.
11420 Contura 4/25 w/209 MB, Windows 2199.
11417 Contura 4/25C w/209 MB, Win. .... 2879.
11646 DESKPRO 4/66M w/510 MB, Win.. 3599.
2016 LTE Lite 4/25 w/120 MB, Windows. 2049.
3029 LTE Lite 4/25E w/209 MB, Win. .... 3099.

NEC Ready Systems
12590 Ready 425CD2 Multimedia System, 170 MB, Windows..... 1499.
13347 Ready 425es, 170 MB, Win..... 999.
13346 Ready 433es, 210 MB, Win..... 1229.
13345 Ready 466es, 250 MB, Win..... 1729.

Texas Instruments TM 4000E Systems
13312 WinDX 2/50 Mono w/200 MB ..... 2739.
6441 WinDX 2/50 Active Matrix 200 MB 3799.
8934 WinSX/25 Mono w/120 MB ..... 1899.
4696 WinSX/25 Passive Color 120 MB.. 2149.

Toshiba Satellite Laptops
14289 T1900 Mono w/120 MB ..... 1499.
13954 T1950CS Passive Color 120 MB ... 2499.
13953 T1950CS Passive Color 200 MB ... 2699.
14343 T1950 Mono w/120 MB ..... 1899.
14354 T4700CS Passive Color w/200 MB 3999.
14355 T4700CS Passive Color w/320 MB 4329.

BUSINESS APPLICATIONS

Aldus
14335 TouchBase for Windows 29.95

Borland International
6788 Quattro Pro 5.0 for Win *(3½" only)* 62.95
10710 Paradox 4.5 for Win *(3½" only)*. 145.95

Caere
4274 OmniPage 386 ..... 319.95
8933 OmniPage Pro 2.1 ..... 489.95

ChipSoft
State Packages DOS or Windows *ea.* 34.95
TurboTax 1040 DOS or Windows *ea.* 39.95
TurboTax/Quicken DOS or Win *ea.* 54.95

Claris Corporation
6022 ClarisWorks/Quicken *(white supp. last)* 95.95
5257 FileMaker Pro Windows 119.95
5228 FileMaker Pro Win Comp. Upgrd 95.95

Delrina
2682 The FarSide Daily Planner ..... 39.

Intuit
Quicken for DOS or Windows *ea.*.. 39.95

Lotus
5982 SmartSuite 469.95 11771 Upg 299.95
2756 1-2-3 4.0 - Win *(2755 5¼")*..... 309.95
3428 1-2-3 4.0 - Win Upg *(3424 5¼")* 99.95
13578 Ami Pro w/Quicken Bundle 269.95
13577 Ami Pro w/Quicken Comp. Upgd . 119.95
5005 Freelance Graphics 2.0 *(3523 5¼")* 349.95

MECA ... 60 day MBG
2798 Manag. Your Money 10.0 *(3½" only)* 34.95
4603 TaxCut for DOS or 3885 Win *ea* 34.95
TaxCut State Pkgs. *(HeadStart) ea.* 29.95

Microsoft
14146 MS-DOS 6.2 Upgrd. for Dummies $45.95
7009 Windows 3.11 *(7010 5¼")* 95.95
12707 Windows NT *(3½" & CD incl.)*..... 319.95
7811 Word for Windows 6.0..... 299.95
2931 Access for Win 1.1 *(2932 5¼")* 299.95
8138 Office 4.0 for Win *(8137 5¼")*... 479.95

MicroTac Software
Span, Ital, Fren or Germ Assist *ea* . 54.95

Peachtree
12287 Accounting for Win. Release 2.... 115.95

Software Marketing
9504 AutoWorks..... 39.95
12714 PharmAssist Windows..... 39.95

Software Publishing
4402 Harvard Graphics 2.0 *(4403 5¼")* 269.95

Symantec
1625 ACT! DOS 2.11..... 264.95
7435 ACT! Windows 1.1 ..... 259.95

Timeslips
12638 Timeslips Release 5 for Windows 189.95

3-D Visions
8883 Stanford Chart for Win *(3½" only)* 58.95

WordPerfect Corporation
3445 Presentations 2.0 for Windows.. 315.95
3795 WordPerfect 6.0 DOS..... 279.95
12914 WordPerfect for Windows 299.95
WordPerfect DOS or Win Ver. Upg 99.95

GRAPHICS & DESIGN

Abracadata, Ltd.
13046 Design Own Home -Arch. Win. 31.95

Adobe Systems
10774 Adobe Photoshop 589.95
6439 Adobe Illustrator 449.95
5475 Adobe Illustr. & Photoshop Bun. 619.95

Aldus
13791 PageMaker 5.0 Windows 579.95
6678 PageMaker 5.0 Win Upgrade 139.95
1085 FreeHand for Win *(3½" only)*..... 395.95

Altsys Corporation
12979 Fontomatic for Windows 1.0..... 38.95
8675 Fontographer for Windows 3.5 . 259.95

Corel Systems
11896 CorelDRAW! 4.0..... 389.95

DeltaPoint
3435 Graphics Tools! 1.0 *(3½" only)*.... 99.95

Fractal Design
4356 Painter 2.0 259.95 13218 X2..... 93.95

HSC Software ... 30 day MBG
12867 Digital Morph 1.0 *(3½" only)*..... 67.95
13956 Kai's Power Tools Windows 89.95

Inset Systems
3820 HiJaak PRO 2.0 for Windows..... 84.95

Micrografx
3628 Windows Draw! 3.0 *(3627 5¼")*.... 49.95

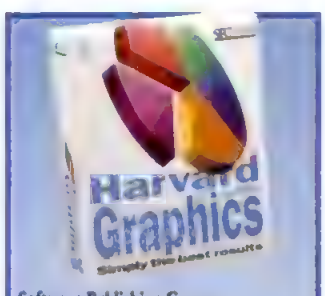
Microsoft
10051 Font Pack 2 Windows 45.95

North Coast Software
6992 PhotoMorph 1.0 for Windows..... 89.95

Shapeware
5426 Visio 2.0 for Win *(3½" only)* 119.95

T/Maker
4680 Incredible ImagePak Windows..... 89.95

Texas Instruments
4696 *TravelMate 4000E WinSX/25 Color Notebook Computer*—6 pounds, 120 MB HD, 8.2" Advanced Passive Color Display, 4 MB RAM *(upgradable to 20 MB)*, 1.44 MB Floppy, Ballpoint Mouse w/QuickPort, DOS & Windows ..... **$2149.**



Software Publishing Corp.
4402 *Harvard Graphics for Windows 2.0*—Create compelling presentations in no time. Powerful graphing and charting, sophisticated drawing and text tools, presentation management, and more **$269.95**
9759 *Upgrade*..... **89.95**

Timeslips
12638 *Timeslips Release 5 for Windows*—Dozens of powerful features let you record hours automatically, speed data entry, perform complex analysis, and customize bills with fonts and graphics **$189.95**

Inset Systems
3820 *HiJaak PRO 2.0 for Windows*—Use virtually any image, anywhere! Convert 70+ image formats. Capture screens. Browse image "thumbnails." Supports OLE, JPEG, PhotoCD, TWAIN, cross-platform conversions, more! . . . **$84.95**

PC Connection®

MEMBER DIRECT MARKETING ASSOCIATION

800-800-0004

394PCM

6 Mill Street, Marlow, NH 03456
SALES 603-446-0004 **FAX** 603-446-7791

Toshiba
14344 *Satellite T1950*—Affordable speed to go! 40 MHz i486DX2, 8K cache, math coprocessor, 4 MB RAM, 9.5" sidekit monochrome STN-LCD VGA display with graphics accelerator and 64 gray scales at 320x200 *(16 at 640x480)*, 200 MB drive..... **$2099.**

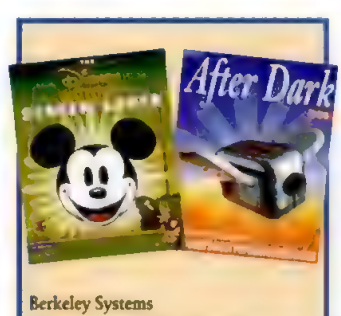
Toshiba
13954 *Satellite T1950CS*—Color for the road! 40 MHz i486DX2, 8K cache, math coprocessor, 4 MB RAM, 9.5" Dynamic-STN dual-scan color VGA display, with graphics accelerator & 256 colors at 320x200 *(16 at 640x480)*, 120 MB drive ... **$2499.**

Norton-Lambert
2754 *Close-Up 5.0 Host & Remote*—eTake control of PCs miles away by modem & run both Windows & DOS applications. For remote access to PCs & networks, file transfer, remote support & general communications..... **$119.**

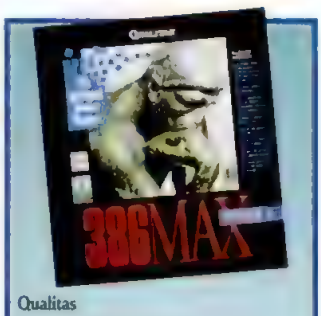
Helix Software
9627 *NETROOM 3*—Speed up Windows and DOS. Features "Cloaking™," which runs BIOSs in protected mode, providing superior compatibility. Incl. "Cloaked" utilities which occupy no memory Product of the Year, *PC WEEK*.... **$59.95**

Softlogic Solutions
10868 *WinSense 2.0*—Fine tune your own Windows 3.1 environment easily and logically. WinSense develops a user profile to maximize your Windows performance. Includes FREE Disk Optimizer for Windows *(while supplies last)*..... **$56.95**

Number Nine Computer Corp.
Fast-forward your Windows redraw speeds with the #9GXE graphics accelerator boards. Among the first boards to use S3's new 928 chip. VLB versions available.
1871 *#9GXE (1 MB) ISA*..... **$249.**
14068 *#9GXE (4 MB) ISA*..... **659.95**



Berkeley Systems
3528 *After Dark DOS*—Over 30 dazzling displays with digital sound and password protection. Enjoy world famous Flying Toasters, Aquatic Realm, Mowin Man and more **$29.95**
6642 *Disney Screen Saver for Windows* **29.95**



Qualitas
12541 *386MAX 7.0 (3½" only)*—New 386MAX version 7 makes DOS under Windows better than DOS itself. Get more conventional memory, a comprehensive memory tester and special support for DOS 6 **$61.95**

SYSTEM UTILITIES & PROGRAMMING

Berkeley Systems
6642 Disney Coll. Scrn. Saver *(3½" only)* $29.95
3528 After Dark 2.0 for DOS *(3½" only)*. 29.95
12030 More After Dark Win. *(3½" only)*... 23.95
6649 Star Trek: Screen Saver *(3½" only)* 29.95

Central Point Software
12833 PC Tools Pro 9.4.95 11395 Win. 89.95
6161 XTree Gold DOS..... 95.95
8957 XTree for Windows..... 64.95

Claris Clear Choice
13219 Imaginaria for Win *(screen saver)* 34.95

Delrina
9853 Opus 'n Bill Screen Saver..... 29.

Helix Software
9627 Netroom 3..... 59.95

Hewlett-Packard
8731 Dashboard 2.0 for Windows..... 46.95

Microsoft
10154 Visual Basic 3.0 Win. Std. Edition 129.95
10437 Visual Basic 3.0 Win. Pro. Edition 319.95
11504 Visual C++ Pro1.5 *(CD only)*..... 399.95

Pacific Microelectronics
13089 Mac-In-DOS for Windows..... 109.95

PC-Kwik
8004 Power Pak 3.1 w/Power Disk..... 45.95

Qualitas
12541 386MAX 7.0 *(3½" only)*..... 61.95

Quarterdeck
3217 QEMM 7.02 *(3221 5¼")*..... 63.95

Softlogic Solutions
10868 WinSense/Desk Optimizer for Win 56.95

Stac Electronics
1409 Stacker 3.1..... 95.95

Symantec
2360 Norton Desktop Win. *(2359 5¼")* 115.95
5136 The Norton Util. 7.0 *(3146 5¼")*. 115.95
8535 pcANYWHERE DOS..... 119.95
11303 pcANYWHERE Windows..... 129.95
6250 Speedrive 4.0 *(3½" only)*..... 65.95

TouchStone Software
11665 CheckIt Pro: Set *(Vols. I & II incl.)* 79.95

NETWORKING/COMMUNICATIONS

Asanté Technologies Hubs ... 5 years
2775 8 Port 249.95 2772 12 Port 499.95

Artisoft
2234 Lantastic AE-2 Start. Kit DOS 5.0 $459.95
2452 AE-2 EtherNet Adapter Card..... 199.95

BOCA Research ... 5 years
8397 M1440I FaxModem..... 119.95
8398 M1440E FaxModem..... 149.95

Coactive Computing
14025 Connect DOS & Win. 1.0 *(3½")*.. 134.95
14028 Starter Pack 1.0 *(3½" only)*..... 189.95

Data Storm
4798 PROCOMM PLUS 2.01..... 69.95
2006 PROCOMM PLUS 2.01 Windows . 95.95

DataViz, Inc.
6508 Conv. Plus for Win. 1.0 *(3½" only)* 89.95

DCA/Crosstalk
5611 Crosstalk 2.0 for Windows..... 119.95

Delrina Technology
2446 WinFax PRO 3.0..... 79.95
5974 DOSFax PRO..... 49.95

Hayes ... 2 years
11396 ACCURA 144+FAX144 *(external)* 229.95
11397 ACCURA 144+FAX144 *(internal)*. 199.95
7395 OPTIMA 144+FAX144..... 389.95
8167 OPTIMA 144+FAX144 PCMCIA.... 309.95

Hilgraeve
12081 HypAcc. Win. 109.95 8204 DOS. 59.95

IBM
13207 Int. FaxModem *(P/N MOD531)*..... 49.95

Intel ... 3 years
2994 EthExpress 16 or 3021 16 TP *ea*... 99.95
1531 FaxModem 14.4/14.4 *(int.)*..... 159.95
1536 FaxModem 14.4/14.4 *(ext.)*..... 179.95
5994 SatisFAXtion Modem/400 ..... 285.95
12934 14.4 PCMCIA FaxModem 299.95
8903 2400 bps Wireless Modem 649.95

Megahertz ... 5 years
10515 C5144 14.4 FaxModem *(Compaq)* 419.95
12763 XJ1144 14400 FaxMod. *(PCMCIA)* 319.95

Microcom
6234 CarbonCopy for DOS..... $129.95
4410 CarbonCopy for Windows..... 129.95

Microsoft
5743 Windows for Workgroups 3.11... 144.95
6172 Windows for Workgroups *(single)* 47.95

Norton-Lambert
2754 Close-Up Host & Remote 5.0..... 119.

Novell
12058 NetWare 4.01 *(10 user)*..... 1899.95
12056 NetWare 4.01 *(25 user)*..... 2799.95

Practical Peripherals ... lifetime
10570 PM14400FX MT..... 215.95
9234 PM14400FXPPM Pock. Fax/Mod. 359.95
2425 PM14400FX SA..... 399.95
6123 PractiCARD 144 *(PCMCIA card)*. 289.95

Shiva
NetModem/E *ea*.....1479.

Solectek
13083 AirLan Bridge..... 3449.95
Starter Kit *(ISA or MCA)*..... *ea.* 1369.95

SupraFaxModems ... 5 years
5252 144LC.. 149.95 11441 144e.... 209.95

Technology Concepts ... 2 years
6315 Fax Line Manager 203..... 124.95

Traveling Software
4407 LapLink V 99.95

U.S. Robotics
11923 Sportster 14.4 FaxModem Int.... 159.95
11924 Sportster 14.4 FaxModem Ext.... 184.95
6631 WorldPort 14.4 PMCIA FaxMod 319.95
11922 WorldPort 14.4 Pocket FaxMod 249.95

Zoom Telephonics ... 7 years
3386 FaxModem AFC 24/96/48 *(int.)*..... 49.95
9519 FaxModem VFP 24K *(internal)*.... 175.95
14763 FaxModem VFP 28.8K *(internal)*. 299.95
4428 FaxModem VFXV .32 bis *(ext.)*..... 149.95
4429 FaxModem VFPV .32 bis *(int.)*..... 124.95

VIDEO & SOUND

Adobe Systems ... 120 day MBG
12891 Premiere 1.0 for Win *(3½" only)* $179.95

Advanced Digital Systems
13985 VGA TV-Elite..... 249.95

Altec Lansing Speakers
12924 ACS50 69.95 12920 ACS300 279.95

Aristosoft, Inc.
6780 Wired for Sound Pro 2.0..... 39.95

ATI Technologies ... 5 years
3886 Graph. Ult.+2 MB 249.95 3871 Pro 369.95
11022 Graphics Ultra Pro EISA *(w/2 MB)*. 399.95

Claris Clear Choice
13907 From Alice to Ocean *(Book & CD)*. 46.95

Creative Labs ... 1 year
5770 Sound Blaster 16 MCA ASP..... 209.95

Diamond Computer ... 5 years
1569 Stealth 24 VLB..... 159.95
1585 Viper VLB..... 399.95

Hauppauge
10593 Win/TV w/Microsoft Video Win... 419.95

IBM
13199 16 bit Audio Card *(P/N AC 523)*.. 169.95

Intel ... 3 years
11587 Smart Video Recorder..... 499.95

KOSS Speakers w/AC ... lifetime
11323 HD-4..... 54.95 11700 HD-6..... 79.95

Logitech ... 2 years
14040 SoundMan Super Pak..... 139.95

Media Vision ... 3 years
12028 ProAudio Studio 16..... 219.95

NEC MultiSync Monitors ... 2 years
11949 3FGE..... 629.95 14317 3V..... 529.95
11948 4FGE..... 749.95

Number Nine
1871 #9GXE *(1 MB)* ISA 3230 VLB... *ea.* 249.

Sony ... 1 year
6801 CDU-7811 Dbl. Speed CD-ROM.. 459.95
10530 CPD-1430 14" Multiscan Trinitron 629.95

INPUT/OUTPUT

Caere ... 1 year
4277 OmniScan *(w/OmniPage Direct)*. 289.95

Canon BubbleJet Printers ... 1 year
7809 BJ-200 315.95 9614 BJ-600 Color 599.95

CoStar ... 1 year
1814 LabelWriter II Plus..... 239.95

PC Connection®

800-800-0004

394PCM

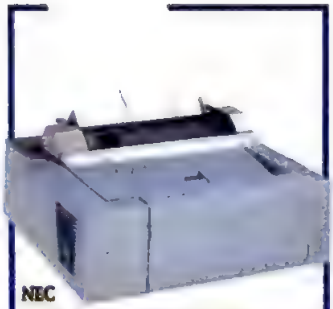
6 Mill Street, Marlow, NH 03456

SALES 603-446-0004 **FAX** 603-446-7791

© COPYRIGHT PC CONNECTION, INC., 1994. PC CONNECTION, PCTV AND THE RACCOON CHARACTER(S) ARE REGISTERED TRADEMARKS OF PC CONNECTION, INC., MARLOW, NH. ALL OTHER TRADEMARKS REMAIN THE PROPERTY OF THEIR RESPECTIVE COMPANIES.

NEC
14677 *Versa 40EC*—A very versatile portable. 40 MHz i486DX2 with 8K cache and built-in coprocessor, 4 MB RAM, 120 MB drive, and 9.5" TFT active matrix color display with 256 colors *(640x480)*. Screen is user-removable/reversible..... **$3839.**

NEC
14313 *Ready 433CD3*—Welcome to the wonderful world of multimedia! You'll be ready for the future with the Ready 433CD3 multimedia PC. It features a 33 MHz 486SX with 8K cache. 4 MB RAM. Local Bus graphics with 1 MB VRAM, FaxModem, and WinFax Lite software. Built-in NEC MultiSpin 3Xi CD-ROM reader gives you fast *(450K/sec)* data retrieval speeds. Also includes a 16-bit stereo sound card. Labtec amplified speakers, CD software, and more! ..... **$1899.**



NEC
14305 *Silentwriter 610*—Crisp laser output up to 50% faster than other printers in its class. Prints up to 6ppm at 300 dpi. Sharp Edge Technology gives 600 dpi appearance. Upgradable to PostScript..... **$699.**
14304 *Silentwriter 1097*..... **1459.**

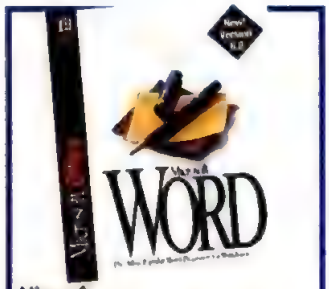
Epson ... 2 years
11800 LQ570+ *(80 col., 269 cps)*..... $269.95
10784 Action Laser 1500 *(2 MB)*..... 699.95
13110 Action Scanning System..... 849.95
Hewlett-Packard ... 1 year
6442 LaserJet 4 *(with toner)*..... 1479.95
13682 4P 1059.95 12212 LaserJet 4L 699.95
7620 DeskJet 550C..... 629.95
IBM
13210 Joystick *(P/N JOY 575)*..... 19.95
13485 Pro. Keyboard *(P/N KB571)*..... 89.95
Kensington Mouse ... 1 year
7899 Expert 4.0 *(ser.)* 99.95 7900 *(bus)* 114.95
Kraft ... 5 years
8346 Thunderstick with JetFighter 2..... 39.95
Logitech ... limited lifetime
3996 Trackman2 *(combo)*..... 89.95
3295 Mouseman *(combo)*..... 59.95
9766 Mouseman *(cordless)*..... 89.95
2468 ScanMan256 w/OmniPage Dir.... 199.95
7463 ScanMan Easy Touch for Win..... 229.95
13934 Cyberman 3D Controller..... 79.95
Microsoft Mouse ... lifetime
7597 Serial Mouse 69.95 2898 w/Win 144.95
1896 Ballpoint Mouse..... 79.95
MicroSpeed ... 1 year
6007 PC-TRAC Trackball..... 59.95
Microtek ... 1 year
13362 SCANDEX 279.95 13361 Scoot. 419.95
5187 ScanMaker II 639.95 5175 IIxe 989.95
13359 ScMaker IIG 489.95 13360 IISP 749.95
Mouse Systems ... lifetime
7878 PC Mouse III *(serial)*..... 69.95
Mustek ... 1 year
8452 Gray Artist for Windows..... 164.95
NEC
14305 Silentwriter 610..... 699.
Okidata ... 1 year
6174 OL400E Laser Printer..... 549.95
Pacific Data
13040 ProTracer II..... 1399.95
13041 ProTracer II w/HP-GL..... 1849.95
Seiko ... 1 year
1506 Smart Label Printer Pro..... 149.95

ACCESSORIES/DISKS

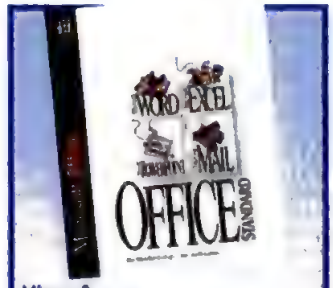
American Power ... 2 years
3819 Back-UPS 250 115.95 3858 400 179.95
7107 Back-UPS 450..... 215.95
Curtis ... lifetime
7654 Command Center Plus..... 78.95
Cyrix
10538 486 DRX2 25/50 Micro. Upgrade $339.95
14035 486 SRX2 20/40 Micro. Upgrade 239.95
Fuji Disks ... lifetime
2215 3.5" HD *(10)* 11.95 2241 *(50)*.... 44.95
5692 3.5" HD Pref. Disks *(20)* w/case..... 22.95
Intel ... lifetime
4750 80387SX 79.95 5409 80387DX.. 85.95
6418 486 DX2 OverDrive Proc. 486SX-25 369.95
Kensington *Full line avail.* ... 1 year
7060 MicroSaver Security System..... 38.95
PC Power & Cooling ... 2 years
9537 CPU Cooler *(386/33 up to 486)*.... 29.95
3203 Turbo Cool 200 149.95 7915 300 159.95
Sony Disks/Cartridges
6375 3.5" HD *(30)* 32.95 11871 *(100)*.. 89.95
1603 DG60M.... 11.95 2520 DG90M.... 14.95
Targus ... lifetime
7369 Notepac 35.95 1305 Universal.... 69.95
3M ... lifetime
1581 DC2120..... 18.95 11013 *(3 pk.)* 49.95
Tripp Lite ... 2 years
6199 Isobar 4-6 43.95 6200 Isobar 6-6 49.95
5550 BC250 Battery Backup..... 119.95
9312 BC500 Battery Backup..... 219.95

DRIVES

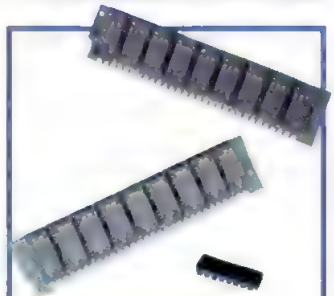
Colorado Memory Systems ... 1 year
4354 Jumbo 250 Tape Backup..... 179.95
1073 Trakker 250 Tape Bckp. *(parall.)*. 349.95
Conner Peripherals ... 1 year
1337 CP30204 250 MB IDE HD *(16 ms)* 289.95
13503 CP30540 540 MB SCSI Drive..... 699.95
Iomega ... 1 year
13803 Bernoulli Insider 150 IDE..... 489.95
10602 Bernoulli 150 MB Cartridge..... 99.95
10452 Transportable MultiDisk 150..... 559.95
6344 PC Powered 90 PRO..... 489.95
10537 PC Powered 150 PRO..... 479.95
2530 90 MB Cart 99.95 2467 Tripak. 289.95
8481 Tape250 Insider Half-Height..... 195.95
MDS Removable Hard Drives
11851 MDS 105 MB 3.5" Int. Remvbl. IDE 429.95
NEC ... 2 years
13339 CDR-400 MultiSpin 3Xp..... 449.95
13341 CDR-500 MultiSpin 3Xi..... 499.95
13340 CDR-600 MultiSpin 3Xe..... 599.95
TEAC ... 1 year
6951 1.2 MB Drive for AT..... 55.95
7371 1.44 MB Drive for AT..... 45.95
4414 3.5"/5.25" Dual Floppy Drive..... 145.95



Microsoft
7811 *Microsoft Word for Windows 6.0*—Powerful Windows word-processing! Toolbar, drag-and-drop editing, improved Mail Merge, AutoFormat, Multilevel Undo, and more!..... **$299.95**
7841 *Version Upgrade*..... **94.95**



Microsoft
8138 *Microsoft Office 4.0 for Windows*—Contains Word 6.0, Excel 4.0 & PowerPoint 3.0 *(w/automatic upgrades to newest version)* & 1-user license for MS Mail..... **$479.95**
11336 *Version Upgrade*..... **249.95**
13333 *Competitive Upgrade*..... **279.95**



PC Connection ... 5 years
Bring out the power of Windows, etc. by boosting your memory. Memory prices may vary. Please call for latest pricing.
5510 *1 MB x 9 SIMMs (80ns)*..... **$59.95**
2497 *4 MB x 9 SIMMs (80ns)*..... **169.95**
5746 *1 MB Chips (80ns, set of 9)*..... **49.95**

OUR POLICY

- We accept VISA and MASTERCARD.
- No surcharge added for credit card orders.
- Your card is not charged until we ship.
- If we must ship a partial order, we never charge freight on the shipment(s) that complete the order (in the U.S.).
- No sales tax, except Ohio residents (please add applicable tax).
- All U.S. shipments insured; no additional charge.
- APO/FPO orders shipped First Class Mail.
- International orders: U.S. 100 minimum, add 2% surcharge and $2.30 insurance. Manufacturer support and upgrade eligibility may be limited outside the U.S.A. Some products not available for export, call or fax information.
- Upon receipt and approval, personal and company checks clear the same day for immediate shipment of your order.
- Corporate P.O.s accepted subject to approval.
- COD maximum $1000. Cash or certified check. COD orders require an additional $4.50 charge. COD orders ship via UPS and may require additional UPS charges.
- 120 day limited warranty on all products. Defective software replaced immediately. Defective hardware repaired or replaced at our discretion. All items subject to availability. Prices and promotions subject to change without notice.
- We are not responsible for typographical errors.
- Order lines opened continuously from 8 a.m. Monday until 5 p.m. Sunday ET. Business offices at 603-446-3383 Monday through Friday 9 a.m. to 5:30 p.m. ET.

SHIPPING

Continental U.S.: The total freight charge on any order placed with PC Connection is only $5. Barring events beyond our control, all credit card orders (no COD orders) phoned in weekdays by 3 a.m. ET will ship Airborne Express for delivery the next business day. Which means *same day* delivery for orders placed between midnight and 3 a.m. ET. (Some orders may ship by UPS Ground for next day delivery). Saturday delivery available to many areas upon request at no additional charge. Order all day Saturday through noon on Sunday for Monday delivery. (Some areas require an additional day delivery).
Hawaii, Alaska, Canada, Puerto Rico and the U.S. Virgin Islands: Shipping to these areas may require additional time and charges.
Call 800-800-0004 for information.
All other areas: Please call 603-446-0004 or FAX 603-446-7791 for information.

Compaq
2016 LTE Lite 4/25 Model 120w—9.5" Passive matrix VGA monochrome screen. 25 MHz 486SL with coprocessor, 4 MB RAM expandable to 20 MB, 8K cache, 3.5" floppy, 120 MB hard drive... **$2049.**

Compaq
13915 *ProLinea MT 4/66 Model 525w*—66 MHz 486DX2 with upgradable processor, 8 MB RAM expandable to 64 MB, 8K cache, 1024x768 Local Bus graphics with 1 MB VRAM, mini-tower case with 16-bit ISA slots, 525 MB drive..... **$2429.**

Compaq
9031 *Prolinea 4/33s Model 120w*—Solid performance at a super price. 33 MHz 486SX with upgradable processor, 4 MB RAM expandable to 32 MB, 8K cache, 1024x768 Local Bus graphics with 1 MB VRAM, 3.5" floppy, 120 MB drive..... **$1099.**

expotech
A VTECH COMPANY

Versatile...portable... powerful and priced right!
expo NOTE 486slc33

Versatile...removable hard drive. Use different hard drives for a variety of uses and you can interchange hard drives with other people. A flexibility of information use you never had before

Portable...weighs less than 7lbs. and fits in your briefcase.

Powerful...4Mb Ram, 120 Meg running at 33 Mhz. As much power as most desktops.

Priced right...just $1299

Your dependable supplier!

Expotech is one of the fastest growing computer companies in the U.S.A. (over 1 million systems sold) For over 10 years we have given the best value, the best support systems and the best service. Our research laboratories are consistently developing the latest and best technology for the lowest cost.

The customer comes first...

We have toll free customer support, a toll free FAX line and support via Prodigy.

Also, we can ship same day (with most systems) after credit approval. You can depend on Expotech

Call today...open 7 days a week

Central Standard Time
Monday - Friday 7am - 8:30pm
Saturday 9am - 6pm Sunday 10am - 3pm

expo NOTE 486slc33

- Weighs less than 7lbs.
- Only 2.1"(H) x 11.4"(W) x 9.25"(D) Fits comfortably in a briefcase
- 4 Mb RAM, 120 Meg Hard Drive
- 640x480 VGA screen with 64 levels of grey plus concurrent VGA external monitor port
- External keyboard port
- Multi I/O (2 serial, 1 parallel)
- 1.44 Meg Floppy
- MS-DOS 6.0, Windows 3.1, Mouse
- Complete power management functions
- Dual voltage A/C adapter included

REMOVABLE HARD DRIVE

- 2400/9600 FAX MODEM BUILT IN

JUST $1299 386sx/33 $1199 *Modem not included in 386 SX/33*

1.800.284.3976 *In Canada 1 800 685 8284*

Software, Modem & Service Package for Desktop & Tower Systems Only. All Prices, Availability, and Specifications subject to change without notice. Please call to confirm pricing, IL Sales Tax, Availability, and Warranty Details.

CIRCLE 003 ON READER SERVICE CARD

expotech
A VTECH COMPANY

800 North Church Street
Lake Zurich, IL 60047

1.800.284.EXPO
FAX 1.800.947.EXPO

GOVERNMENT & EDUCATION 1.800.947.5461
CANADA 1.800.685.8284

THE NEW PINNACLE SIERRA 1.3GB™ OPTICAL HARD DRIVE

It's The Ultimate In Storage!

4500 RPM

19 msec effective access time

2.0 MBytes per sec. data throughput

THE LAST HARD DRIVE YOU'LL EVER NEED

Introducing the Sierra™ 1.3 Gigabyte optical hard drive with speeds faster than most magnetic hard drives and removable media for infinite capacity. With each additional standard optical disk you'll have another 1.3 Gigabytes of capacity to store spreadsheets, databases, CAD/CAM, graphics, multimedia or any data intensive application demanding mountains of storage.

The Sierra™ 1.3 GB is a lightning fast mass storage system with performance that rockets past most magnetic hard disk drives. (see chart)

OPTICAL PERFORMANCE ADVANTAGE

	XCOPY 20MB TO OPTICAL DRIVE/HARD DRIVE	XCOPY 50MB TO OPTICAL DRIVE/HARD DRIVE
PINNACLE SIERRA™ 1.3GB	135.3 seconds	379.5 seconds
SEAGATE ST4766N (630MB)	210.6 seconds	496.8 seconds
FUJITSU M2266SA (1.2GB)	165.5 seconds	375.1 seconds
MAXTOR XT-8760SH (676MB)	178.9 seconds	428.7 seconds

Optical technology has many advantages such as removability, reliability, expandability, and is less expensive than magnetic storage solutions.

OPTICAL PRICE ADVANTAGE

RETAIL COST @	1.3GB	2.6GB	5.2GB
PINNACLE SIERRA™ 1.3GB	$3445	$3695	$4195
HARD DISK DRIVE	$3250	$6500	$13,000

"It has a 19 millisecond access time and outperformed every other device we tested here." Stanley Wszola, *Byte*

With Pinnacle's ASCENT program you can upgrade your Sierra™ 1.3GB to a Pinnacle optical library system that ranges in capacity from 20 Gigabytes to 186 Gigabytes for Novell®.

The Sierra™ ... only by Pinnacle. The optical storage leader. For more info call:

800.553.7070

Ansel Adams Wilderness, Sierra National Forest

Trademarks: Sierra and Sierra 1.3 GB of Pinnacle Micro, Inc. All trademarks and registered marks in their respective owners.
Pricing acquired directly from System Integrator, as 9/15/93. Avg. hard drive cost $2.50 per Megabyte. Tests performed by NSTL.

PINNACLE MICRO

THE OPTICAL STORAGE COMPANY™

19 Technology • Irvine, CA 92718 • U.S.A. • Int'l (714) 727-3300 • Fax (714) 727-1913

CIRCLE 098 ON READER SERVICE CARD

you turn to the next-to-right column. Here, because the 6 has been demoted to a 5, you need to borrow again. The 5 becomes 15, and the number to the left of the 5 is decremented from 7 to 6.

When you subtract one date from another, the borrowing process is the same as it is with ordinary numbers, except for the amounts that get borrowed. For example, suppose you want to perform the following subtraction:

```
 Year    Month    Day
  93       11      16
-87        12      17
```

Before you can subtract 17 from 16, the 16 needs to borrow some days from the Month column. But how many days need to be borrowed? Well, you want the date to represent the same point in time after the borrowing as before, so you need to transform the 16th of November into the 47th of October. In other words, you need to borrow 31—the number of days in the month to which the Month column will be demoted—from the Month column.

After you do the Day-column subtraction, you'll need to take away 12 from 10 in the Month column, which means you must arrange another such loan. This time, you'll want the loan to change the date's representation from the 10th month of 1993 into the 22nd month of 1992—which means you'll need to borrow 12 from the Year column.

As you can see, when the Month column needs to borrow, it will always borrow 12. But when the Day column needs to borrow from the Month column, the loan will depend on where you are in the calendar. Clearly, that's a vexation as far as your macro is concerned!

Fortunately, in Mr. Zenczak's application—that is, calculating an employee's full years of service and full months since his most recent anniversary date—the day component of the subtraction is unnecessary; it affects neither of the values of interest. Thus, in doing its borrowing, the necessary macro can simply decrease the Month column by 1 without even bothering to increase the Day column.

In response to Alt-Y (Ctrl-Y in Lotus 1-2-3 for Windows), the 1-2-3 macro prompts you for six inputs—the year, month, and day components of the severance date, followed by the year, month, and day components of the hire date. It then does its subtraction and displays the results in cells B1 through B4. Note that the accrued-vacation value is 1/12 multiplied by the number of months since the last anniversary date. If you want months instead of twelfths, remove the "/12" near the end of the {let} statement in B17. And before running the macro, be sure to assign the labels in column A as names for the adjacent cells in column B.

The Excel 5.0 code shown in Figure 3 produces two user-defined functions. Each function requires two arguments—the severance date followed by the hire date. Both can be entered as simple date values—for example, 11/16/93 and 12/18/87. If the module in which these functions reside is part of the current workbook, you can reference the functions just as you would a built-in Excel function. For example, to calculate the number of service years rendered by an employee who started on December 18, 1987, and quit on November 16, 1993, you would enter the following:

```
=YearsOfService(11/16/93,12/18/87)
```

A few notes about the code are in order. The variable declarations at the top of the module aren't strictly necessary but are regarded as good programming practice. Declaring the variables' data types (Date and Integer) as well as their names saves a bit of memory, since otherwise Excel will assign these variables to the default data type (*variant*), which allows any kind of spreadsheet data and hence requires more storage space. Using integers instead of variants won't get you any noticeable speed improvement in macros of this size, but this too is considered proper programming practice.

The `Application.Volatile` statement in each function ensures that Excel will update the function's result whenever the worksheet is recalculated. If you omit this, the functions must be reentered to be recalculated.

Finally, a word or two about formulas. The years-of-service formula proposed by Mr. Zenczak,

```
@YEAR(SEVDATE-HIREDATE)
```

subtracts the serial date value of the hire date from the serial date value of the severance date, to get the number of days elapsed between the two milestones. The formula then treats that number itself as a serial date value and extracts the year component from the result. Because of leap-year complications, this approach fails under some circumstances. For example:

```
@YEAR(@DATE(93,7,15),
@DATE(87,7,15))
```

returns 5, instead of 6.

You can create formulas that use @IF statements to encapsulate the logic contained in the macro in Figure 2. For example, for years of service, I cobbled together the following:

```
@IF(HIREMONTH>SEVMONTH#OR
#(HIREMONTH=SEVMONTH#AND
#HIREDAY>SEVDAY),SEVYEAR-1
-HIREYEAR,SEVYEAR-HIREYEAR)
```

And for the accrued vacation I used the following formula:

```
@IF(HIREMONTH>SEVMONTH#OR
#(HIREMONTH=SEVMONTH#AND#HIREDAY
>SEVDAY),SEVMONTH+12-HIREMONTH,
SEVMONTH-HIREMONTH)/12
```

Because it is very difficult to see exactly what is going on in these formulas, however, I would recommend that you use a macro instead.

—Craig Stinson

Databases

NUMERIC DAY OF THE YEAR REVISITED

TIP After going over the FoxPro NDY() function that returns the relative Julian number, which appeared in the December 21, 1993, Solutions column, I managed to tune it up a bit. You can avoid the LTRIM() of YEAR(), because CTOD() doesn't care about blank spaces in the date. You can also avoid LTRIM() and STR() with PADL(), because PADL() already performs both func-

Build a Better Office.

And the World Will Beat a Path to Your Door.

Upgrade to Microsoft® Office Standard 4.0 from a qualifying Microsoft Office program for only **$229*** or upgrade from a qualifying competitive product for only **$279.**** Full product price is **$469**. You'll get the latest releases of Microsoft's renown programs for Windows™–Microsoft Word, Microsoft Excel, Microsoft PowerPoint® and Microsoft Mail. Plus you'll also receive The Automatic Upgrade– a voucher, good until 5/31/94, that entitles you to **FREE** upgrades of Microsoft Excel 5.0, and Microsoft PowerPoint 4.0.

A Whole New Way to Work

The Microsoft Office family is a collection of full-featured products that work alike and work together as if they were a single program. All programs in the Microsoft Office family are critically acclaimed-leaders. They take you well beyond the usual approach to ease of use, integration, and custom solutions.

A Whole New Way to Buy

Software Spectrum is the best source for buying all your Microsoft products. Plus you can realize even greater discounts by buying licensed product through Microsoft Select, a volume licensing discount program. And Software Spectrum is ready to help you implement Microsoft Select with Assurance,℠ our PC software management process and the corresponding implementation services.

For over a decade, Software Spectrum has been providing superior customer service and value to companies just like yours. Call Software Spectrum today.

$229* Upgrade Price

SOFTWARE SPECTRUM

1-800-824-3323

7am to 7pm Central

IN CANADA CALL 1-800-624-6224

*Upgrade from an earlier version of MS Excel, Word, PowerPoint,. MS Access or Office. **Upgrade from qualifying word processors, spreadsheets, presentation graphics packages or databases. Proof of purchase required. Prices subject to change. Other restrictions may apply. All company and product names are the property of their respective owners. ©1994 Software Spectrum

CIRCLE 282 ON READER SERVICE CARD

A New Generation of Choices

Only from VTECH™

Are you looking for the Ultimate in Upgradability and Performance? Are you looking for More Features and Better Value ?

VTech delivers both. With VTech you get twice the choices - our expotech series has established a position as the highest value line of systems in the industry and the new Platinum series has already been acknowledged as a leader in advanced computer designs where performance is the bottom line.

VTech is a manufacturer of complete systems, not just an assembler. With VTech you get the high performance you need for today's software and the quality and support you can only get from an international manufacturer with over 10,000 employees and 3 research and engineering labs.

intel inside

Choose Hot Value

Only a manufacturing company can afford to offer the lowest prices. Up to 25% lower

When you're a manufacturer that designs and makes its own components, you cut out the middle man. That means lower costs for us, *and better value for you.*
Check it out!

Only a quality driven company can stand behind it's product with a 3 Year Warranty

Why can Expotech offer a longer warranty then others? Because our research engineers are continually improving existing product design and manufacturing technology to assure highest quality, full compatability and superior performance, we can offer a longer warranty than the leading competition.

Only an innovative company can offer a FREE software preview.

We've teamed up with Microsoft to offer pre-installed versions of the most popular software titles. Now you can buy only after you know about the software and know what's right for you.

- Every system comes pre-installed with the best titles from Microsoft
- Demos explanations are given to you on line.
- Simply call the toll free number provided and buy the program (at deep discounted prices) with a credit card
- Instantly, you'll be given an unlocking key code to release the full program

expotech by VTECH

Only a technologically advanced company can build in Remote diagnostics and a Send/Receive Modem/Fax with every system

Every Expotech computer is equipped with a modem and special software that will let us access your computer, diagnose the hardware, solve the problem.
All from the comfort of your own telephone!

3 YEAR WARRANTY

Standard Features

- Intel Pentium Technology ready
- Local Bus Graphics Accelerator with 1 MB RAM
- Desktop Metal Cases
- 5.25" and 3.5" floppy drives
- Remote Diagnostics Software
- 9600/2400 send/receive Fax/modem
- Anti-Virus Software
- Multi I/O - 2 Serial and 1 Parallel
- High performance keyboard, mouse
- MS-DOS 6.2, Windows 3.1

BEST BUY ▼

System 1	System 2	System 3	System 4	System 5
All Standard Features+	All Standard Features+	All Standard Features+	All Standard Features+	All Standard Features+
Intel 486SX25	Intel 486SX33	Intel 486DX33	Intel 486DX2/50	Intel 486DX2/66
210MB hard drive	210MB hard drive	340MB hard drive	424MB hard drive	424MB hard drive
4MB RAM	4MB RAM	4MB RAM	4MB RAM	8MB RAM
14" .28 non-interlaced monitor	14" .28 non-interlaced monitor	14" .28 non-interlaced monitor	14" .28 non-interlaced monitor	15" .28 non-interlaced monitor
		With 128k cache	With 128k cache	With 128k cache
$1149	**$1199**	**$1499**	**$1599**	**$1899**

Popular Options

■4, 8, or 16MB RAM ■15" .28 non-interlaced monitor ■17" .28 non-interlaced monitor ■Combo floppy drives

SERVICE FEATURE		DELL	GATEWAY	ZEOS	COMPAQ PRESARIO	IBM PS/1
3 YEAR WARRANTY	YES				YES	
REMOTE DIAGNOSTICS	YES				OPTION	
24 HOUR TELE-TECH SUPPORT	YES			YES	YES	YES
FREE ON SITE SERVICE	YES	YES	YES		YES	YES
OPEN 7 DAYS / WEEK	YES	YES		YES		
EXPRESS PARTS SERVICE	YES	YES	YES	YES		
FAX TECHNICAL ADVICE	YES	YES	YES	YES		
SYSTEM FEATURE						
ANTI VIRUS SOFTWARE	YES					
FREE FAX/MODEM	YES					
SERVICE VALUE RATING PC COMPUTING AUG 1993	★★★★★	★★	★★	★★	★★	★★

intel inside

Novell Labs Tested & Approved

MICROSOFT WINDOWS COMPATIBLE

VTECH™ Technology you can afford

Call 1.800.284.3976 *in Canada 1.800.685.8284*

Software, Modem & Service Package for Desktop & Tower Systems Only.
All Prices, Availability, and Specifications subject to change without notice.
Please call to confirm pricing, & Sales Tax, Availability, and Warranty Details.
The Intel Inside logo is a trademark of Intel Corporation.

expotech™ BY VTECH™

Choose VESA Performance

3 YEAR WARRANTY

Standard Features

- Intel Pentium Technology ready
- 2 VESA expansion slots
- VLB Graphics Accelerator with 1 MB RAM
- Desktop Metal Cases
- 3.5" floppy drive
- Remote Diagnostics Software
- 9600/2400 send/receive Fax/modem
- Anti-Virus Software
- Multi I/O - 2 Serial and 1 Parallel
- High performance-Tactile Keyboard, Mouse
- MS-DOS 6.2, Windows 3.1

Vesa Local Bus Systems

If you're after high speed Windows performance, the VESA local bus systems from Expotech deliver. By using the latest in VESA local bus technology these systems blow away the competition at prices that prove Expotech is the value leader.

By using the tremendous manufacturing resources of VTech, Expotech can deliver high quality products at the lowest possible cost. Expotech is the only choice when the bottom line is getting the most for your money.

Two VESA local bus slots are provided plus our high speed graphics accelerator make the VESA system from Expotech the highest value VLB system available.

BEST BUY ▼

System 1	System 2	System 3	System 4	System 5
All Standard Features+	All Standard Features+	All Standard Features+	All Standard Features+	All Standard Features+
Intel 486SX33	Intel 486DX33	Intel 486DX2/50	Intel 486DX2/66	Intel 486DX2/66
250MB hard drive	340MB hard drive	424MB hard drive	424MB hard drive	424MB hard drive
4MB RAM	4MB RAM	4MB RAM	8MB RAM	16MB RAM
14" .28 non-interlaced monitor	14" .28 non-interlaced monitor	15" .28 non-interlaced monitor	15" .28 non-interlaced monitor	15" .28 non-interlaced monitor
	With 128k cache	With 128k cache	With 128k cache	With 128k cache
$1299	**$1549**	**$1699**	**$1999**	**$2299**

Popular Options

4, 8, or 16MB RAM ■ 15" .28 non-interlaced monitor ■ 17" .28 non-interlaced monitor ■ Combo floppy drives

TOWER OPTIONAL

- **24 hour tele-tech support.** Toll free tele-technical support available 24 hours a day,
- **30 day money back guarantee.** Full refund if you're not satisfied in the first 30 days after shipment.

VTECH™ Technology you can afford

Call 1.800.284.3976 *in Canada 1.800.685.8284*

intel inside

Choose Interactive Multi-Media

expotech™ BY VTECH™

3 YEAR WARRANTY

Standard Features

- Intel Pentium Technology ready
- Accelerated Local Bus
- Desktop Metal Cases
- Remote Diagnostics
- 9600/2400 send/receive Fax/modem
- 3.5" floppy drive
- Double speed CD ROM
- Stereo speakers
- Stereo sound board
- High performance keyboard, mouse
- MS-DOS 6.2, Windows 3.1
- AD-lib, MPC compatible
- Sound blaster compatible
- Compton's Interactive Encyclopedia
- Webster's Dictionary
- World Atlas

BEST BUY ▼

System 1	System 2	System 3	System 4	System 5
All Standard Features+	All Standard Features+	All Standard Features+	All Standard Features+	All Standard Features+
Intel 486SX25	Intel 486SX33	Intel 486DX33	Intel 486DX2/50	Intel 486DX2/66
250MB hard drive	250MB hard drive	VLB accelerated graphics	VLB accelerated graphics	VLB accelerated graphics
4MB RAM	4MB RAM	340MB hard drive	424MB hard drive	424MB hard drive
14" .28 non-interlaced monitor	14" .28 non-interlaced monitor	4MB RAM	8MB RAM	8MB RAM
		15" .28 non-interlaced monitor	15" .28 non-interlaced monitor	15" .28 non-interlaced monitor
		With 128k cache	With 128k cache	With 128k cache
$1399	$1449	$1799	$1999	$2199

Popular Options ■4, 8, or 16MB RAM ■15" .28 non-interlaced monitor ■17" .28 non-interlaced monitor ■Combo floppy drives

- **Bulletin board service.** Download drivers and talk to techs on line
- **Visa, Mastercard, Discover**
- **Corporate leasing available**
- **Purchase orders accepted.** COD and terms for qualified buyers

intel inside

Novell NetWare Tested & Approved

MICROSOFT WINDOWS COMPATIBLE

Software, Modem & Service Package for Desktop & Tower Systems Only
All Prices, Availability, and Specifications subject to change without notice
Please call to confirm pricing, ft. Sales Tax, Availability, and Warranty Details
The Intel Inside logo is a trademark of Intel Corporation.

Multi-Media Systems

Multi-Media systems can really turn your computer into a complete information resource for you and your family. Stereo sound and full motion video, interactive encyclopedia, educational software and games really come to life.

VTech has been building complete multi-media systems for years and we know what it takes to get all system components working together. Your VTech system will arrive completely setup and ready to run.

The VTech multi-media systems all feature double speed CD-ROM drives that doubles the data throughout and really enhances video and audio performance of today's multi-media software.

The VTech sound board provides a full 20 voices rather than the usual 11 or 16 voices the other manufacturers provide.

VTECH™
Technology you can afford

VTECH™
Platinum™

"Put the Power of Two Engines Under the Hood"
Computer Shopper, February, 1994

"The overall performance of the V-Tech gave it the highest ratings of any of the 486 systems, and the jaw dropping price is outstanding"
Computer Shopper, February, 1994

"Multiprocessing is clearly the wave of the future"
PC Week, August 23, 1993

"V-Tech leads in PC Multiprocessing"
PC Magazine, October 12, 1993

"The awesome V-Tech Platinum beats the Pentium and costs a cool $3,995"
Computer Shopper, February, 1994

"This system costs less than many single Pentium platforms, and its performance, at least under NT, would be 20 to 30 percent faster for any multithreaded application."
Computer Shopper, February, 1994

VTECH™ Technology you can afford

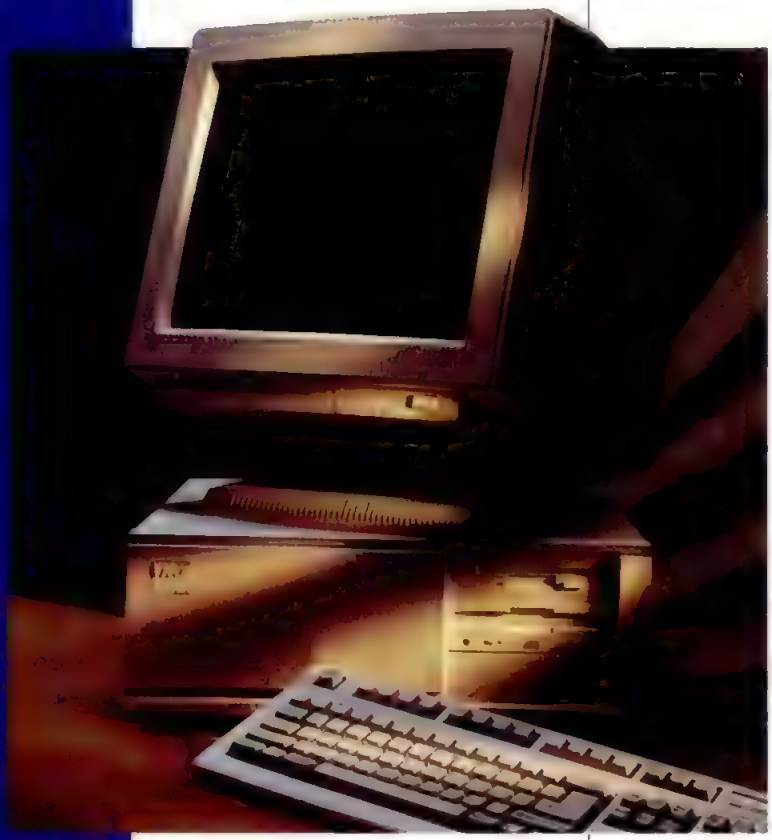
Double your power

Advanced technology makes the difference.

VTech is the first and only company to bring Symmetrical Multiprocessing to the desktop at prices that compete with Single Processor Systems. The Vtech Platinum 486 computers are the fastest, most powerful systems available.

Upgradability

VTech provides you with three upgrade paths. From the single processor Platinum 486 you can upgrade to dual 486 processors, a single Pentium Overdrive™ processor, or for the ultimate in power and performance, dual Pentium Overdrive™ processors.



Each VTech Platinum 486 is designed with an exclusive copy back cache with cast-out buffering, high performance memory design, VESA Local Bus slots, two cooling fans, on board SCSI II, and self-sensing setup all managed by the industry's most advanced BIOS.

The VTech difference

Vtech engineers have developed a revolutionary system for achieving true Symmetrical Multiprocessors under Microsoft Windows NT. One year ago the experts told VTech it couldn't be done, but today the VTech Platinum SMP is receiving the critical acclaim that has earned the respect of the entire PC Industry.

VTech uses its own designs and makes almost every part of this system itself. "The finish work on the system is nice, with the inside of the case chrome-plated, and all the boardwork and connections clean and neat", stated *Computer Shopper.*

The VTech Platinum 486 is the only desktop computer that is Pentium OverDrive™ Ready and Symmetrical Multiprocessor ready. No more worrying about obsolescence, the VTech Platinum gives you the high performance you need today and the upgradability you'll need tomorrow.

SMP READY

intel inside

...Only from VTech

486DX2/50 single

- Intel 486DX2/50 Processor
- Pentium Overdrive™ ready
- SCSI II (on board)
- 256k Cache
- VESA Local Bus
- S3 Windows Accelerator Video Card w/1MB RAM
- 8MB System RAM
- 3.5" Floppy Drive
- 424MB Hard Drive
- 16550 Serial Port Controllers
- 15".28 Non-Interlaced Monitor
- MS DOS 6, Windows 3.1
- High Resolution Mouse

$1999

486DX2/66 single

- Intel 486DX2/66 Processor
- Pentium Overdrive™ ready
- SCSI II (on board)
- 256k Cache
- VESA Local Bus
- S3 Windows Accelerator Video Card w/1MB RAM
- 8MB System RAM
- 2X CD-ROM, 3.5 FD
- 424MB Hard Drive
- 16550 Serial Port Controllers
- 15".28 Non-Interlaced Monitor
- MS DOS 6, Windows 3.1
- High Resolution Mouse

$2299

486DX2/66 plus

- Intel 486DX2/66 Processor
- Pentium Overdrive™ ready
- SCSI II (on board)
- 256k Cache
- VESA Local Bus
- S3 Windows Accelerator Video Card w/1MB RAM
- 16MB System RAM
- 2X CD-ROM
- 3.5" Floppy Drive
- 424MB Hard Drive
- 16550 Serial Port Controllers
- 15".28 Non-Interlaced Monitor
- MS DOS 6, Windows 3.1
- High Resolution Mouse

$2799

486DX2/66 dual

- 2 Intel 486DX2/66 Processors
- Pentium Overdrive™ ready
- SCSI II (on board)
- 256k Cache
- VESA Local Bus
- S3 Windows Accelerator Video Card w/1MB RAM
- 16MB System RAM
- 2X CD-ROM
- 3.5" Floppy Drive
- 527MB Hard Drive
- 16550 Serial Port Controllers
- 15".28 Non-Interlaced Monitor
- MS DOS 6, Windows NT
- High Resolution Mouse

$3799

Options

■ 17".28 Monitor ■ CD ROM Upgrades ■ Increased RAM ■ High Speed 14.4 Modems ■ Combo Floppy Drives ■ Multi-Media kit

Twice the Power, Performance & Expandability

The Expandable 486

Specifications

Processor
- Intel 486DX2/50 or 486DX2/66
- ZIF processor socket - Pentium Overdrive™ ready

Optional Multiprocessor
- MP Power Card with a second Intel 486DX2/50 or 486DX2/66 processor

Secondary Cache
- 256k Cache (Copy back w/cast out buffering)

Memory
- Supports 4, 8, 16 or 32MB SIMMS Four 72 pin SIMM sockets support 36 bit JDEC style SIMMs which may be inserted in any configuration

Bus Slots
- Six (6) ISA Slots
- Two (2) VESA VL Slots
- One (1) MP Connector Slot

Ports
- Two (2) serial ports 16550-DB9
- One (1) serial port ECP-DB25
- PS/2 mouse port
- IDE port-floppy controller
- SCSI II connector on board

Chassis
- Height 6.5" Width 16.6" Depth 17.1"
- Supports three 5.25" or 3.5" external drive bays and one 3.5" internal hard disk drive

Advanced BIOS
- Supports multiprocessing start-up for advanced SMP capable operating system (Windows NT)
- Automatically detects and reports all processors installed and active
- Flexible memory configuration supports 288MB floppy drives
- Ability to autotype IDE hard disk
- Built-in Adaptec SCSI II support
- Two level password protection

Introducing Pentium. The newest addition to the Platinum series

Standard Features
- Intel 60MHz Pentium processor
- Next generation Pentium Overdrive processor P5T ready
- 256k cache
- 2 PCI expansion slots
- Window's accelerator with 1MB expandable to 2MB
- Dual cooling fans
- Advance BIOS with 2.88MB floppy drive support
- Energy saving functions utilizing Intel System Management mode
- Two fast serial ports (16550 support)
- Enhanced parallel port
- Enhanced capabilities port
- Supports VTech Mezzanice board (business audio, networking and modem)
- 3.5" floppy drive
- 15" non-interlaced monitor
- Self sensing set-up
- High performance-tactile keyboard
- MS-DOS 6.2, Windows 3.1

BEST BUY

Platinum P5-60

- All Standard Features+
- 424MB hard drive
- 8MB RAM
- Double speed CD-ROM

$2799

Platinum P5-60

- All Standard Features+
- 527MB hard drive
- 16MB RAM
- Double speed CD-ROM
- 15" non-interlaced monitor

$3299

Popular Options
- 4MB, 8MB, 16MB or 32MB RAM
- 17" non-interlaced monitor
- Combo floppy drives

For more information and to order call

1.800.284 3976 FAX:1.800.947 3976

GOVERNMENT & EDUCATION 1.800.947.8461 CANADA 1.800.685.8284

7 days a week: CENTRAL STANDARD TIME

MONDAY-FRIDAY 7AM - 8:30PM / SATURDAY 9AM - 6PM SUNDAY 10AM - 3PM

AN EXPERIENCED KNOWLEDGEABLE REPRESENTATIVE CAN HELP YOU WITH ANY QUESTIONS

VTECH™ 800 Church Street Lake Zurich Illinois 60047

3 YEAR WARRANTY

Software Modem & Service Package for Desktop & Tower Systems Only
All Prices, Availability and Specifications subject to change without notice
Please call to confirm pricing, S. Sales Tax, Availability and Warranty Details.
The Intel inside logo is a trademark of Intel Corporation

CIRCLE 305 ON READER SERVICE CARD

VTECH™ Platinum

- Toll Free 24 Hour Tele-Tech Support
- Bulletin Board Service
- Three Year Warranty
- One Year On-Site Warranty
- 30-Day Money Back Guarantee

No one else can offer you so much value, dependability and support... Only

VTECH™

Cutting edge technology you can afford

expotech by VTECH

VTECH™ Platinum

intel inside

NDY FUNCTION

Complete Listing

```
*****************************************************************
* FUNCTION ndy                                          FoxPro
* Returns a character string of length 3, left padded with zeros
* reflecting the number of the day of the year: 001-365 or 366.
*****************************************************************
FUNCTION ndy
PARAMETER D
boy = CTOD("01/01/"+STR(YEAR(IIF(EMPTY(D),DATE(),D))))
RETURN PADL(((D - boy) + 1),3,'0')
```

Figure 4: **This FoxPro function is a faster version of the function published in the December 21, 1993, issue. It accepts a date parameter (or uses the current date if none is passed) and returns the corresponding relative Julian date.**

NDYC FUNCTION

Complete Listing

```
*****************************************************************
* FUNCTION ndyc      Includes parameter check          FoxPro
* Returns a character string of length 3, left padded with zeros
* reflecting the number of the day of the year: 001-365 or 366.
*****************************************************************
*****************************************************************
FUNCTION ndyc
PARAMETER D
boy = CTOD("01/01/"+STR(YEAR(IIF(PARAM()=0,DATE(),D))))
RETURN IIF(EMPTY(D) OR TYPE("d")#"D","Inv",;
       PADL(((D - boy) + 1),3,'0'))
```

Figure 5: **This version of the function shown in Figure 4 includes additional code to return "Inv" if an invalid parameter is passed.**

tions. Also, I use PARAMETERS() instead of EMPTY():

```
FUNCTION ndy1
PARAMETERS D
D=IIF(PARAM()=0,DATE(),D)
RETURN PADL((D+1)-CTOD("1/1/"+;
  STR(YEAR(D))),3,"0")
```

In both your NDY() and this modification, passing an invalid date, such as {02/30/92}, produces an invalid answer. To solve that problem, I created another version called NDY2():

```
FUNCTION ndy2
PARAMETERS D
D=IIF(PARAM()=0,DATE(),D)
RETURN IIF(EMPTY(D) OR ;
   TYPE("d")#"D","Inv",;
   PADL((D+1)-CTOD("1/1/"+;
   STR(YEAR(D))),3,"0"))
```

NDY2() adds a type check and a test for an empty date. The type check keeps the routine from blowing up if you pass it a nondate. The EMPTY() test determines whether you passed a valid date. When you store an invalid date to a memvar, it still has a date type, but it's empty. If you pass an invalid date, NDY2() returns "Inv".

Dave Kalman
San Mateo, California

►PC MAGAZINE: Nice job! The relative Julian date in contemporary usage is the number of days, from 1-365 or 1-366, that have elapsed since the first day of the current year. The original NDY() function used to calculate this number, which we published in the December issue, included the following call to FoxPro's CTOD() (character-to-date) function:

```
CTOD("01/01/"+LTRIM(STR(YEAR(;
IIF(EMPTY(D),DATE(),D)))))
```

As Mr. Kalman correctly points out, the call to the LTRIM() function to trim blanks from the parameter passed to CTOD() is unnecessary, because the CTOD() function ignores the blanks. First lesson: You need not worry about extra spaces in calls to CTOD(). To verify this, type the following into FoxPro's command window:

```
? CTOD("01/01/    1993      ")
```

You'll see that FoxPro correctly converts the string. In fact, this will work, too:

```
? CTOD("   01/   01/   1993 ")
```

The NDY() routine included this call to FoxPro's PADL() function:

```
PADL(LTRIM(STR((D-boy)+1)),; 3,'0')
```

It turns out that the PADL() (pad left) function accepts a numeric, date, or character expression as the first parameter. Thus, the calls to LTRIM() and STR(), which convert the result of the calculation to a left-trimmed character string, are not necessary either. Second lesson: PADL() doesn't work with just character strings but accepts either a numeric, a date, or a character-type first parameter. Mr. Kalman's NDY1() function incorporates these improvements and shows an approximate 4 percent performance gain over the original NDY() function.

The NDY1() function gets its result in a different manner from that of the original NDY(). I tried removing the extra function calls from the original NDY(), thereby creating the new NDY() function, which is shown in Figure 4. Accompanying it, in Figure 5, is NDYC(), which also checks for an invalid parameter. Interestingly, NDY() executes slightly faster than NDY1(), and NDYC() executes slightly faster than NDY2(), at least on my machine. The results were close enough, however, that your speed may vary depending on your processor environment and your release of FoxPro. All four functions—NDY1(), NDY2(), NDY() and NDYC()—can be found in NDY2.PRG on PC MagNet. Look in the Databases Library of the Utilities/Tips Forum.— *Sal Ricciardi*

Graphics

TEXTILE DESIGN SYSTEMS

❓ My company wants to produce original designs for fabric printing. This will involve both creating the patterns and

Super Selection

VALUELINE

Since 1979

WHERE MORE THAN JUST THE PRICE IS RIGHT

Great Service

Big Savings

- OVER 15,000 NATIONAL BRANDED PRODUCTS
- THOUSANDS OF SOFTWARE TITLES IN STOCK
- CERTIFIED REPAIR SERVICES DEPARTMENT IS AUTHORIZED ON EVERY PRODUCT WE SELL

(800) 700-1000

24 HOUR FAX LINE (708) 677-7168

IN ILLINOIS (708) 933-1100

HEWLETT PACKARD

DeskJet 500	289
DeskJet 500 C Color	379
DeskJet 550C Color	599
DeskWriter for MACs	269
DeskWriter C Color Printer for MACs	379
DeskWriter 550C Color Ptr for MACs	589
DeskJet 310 Portable for IBMs	309
DeskWriter 310 Portable for MACs	309

IBM PS/1 Multiple Mid Megabyte

486SX/25 129HD	$899
486SX/33 170HD	1199
486DX2/50 340HD	1750
486DX2/66 253HD	1899
486SX/25 170HD Multimedia	1549
486DX2/50 253HD Mini-Tower	1649

NOTEBOOKS

486SL/25 85MB-Mono	$1799.00
486SL/25 126MB-Color	2587.50

TOSHIBA

T1900C/120	$2049	T4600C/200	$3949
T1900C/200	2249	T4600C/320	4249
T4600/120	1999	T6600C	5949
T4600/200	2299	T6600C/CD	6449
		T6600C/CDV	7449

AST

Bravo LC 486DX/33-213HD	$1195
Bravo LC 486DX/33-213HD	1449
Bravo MT 486DX/33-173HD	1449
Bravo MT 486DX/33-343HD	1847
Bravo Notebook 486/25SX-123HD	1698
Bravo Notebook 486/25SX-173HD	1796
Active Notebook 486C/25SX-173HD	3099
PowerExec Notebook 486/25SL-200HD	2395

COMPUTERS

PACKARD BELL

486SX/25 170HD	$799
486SX/25 210HD	999
486SX/25 170HD Multimedia	1199
486SX/25 210HD Multimedia w/TV3	1699
486SX/33 245HD Tower	1099
486DX2/33-66 245HD	1575
486DX2/33-66 450HD Tower	1695

LEADING EDGE

INCLUDES 14" VGA COLOR MONITOR

486SLC/33 120HD w/ 42 VGA	$899
486SLC/33 170HD w/ 39 SVGA	1099
486SLC/33 245HD w/ 28 SVGA	1199
486DX/33 260HD w/.28 SVGA-VL	1499

Canon

NoteJet 4/25 135HD with Built-in Printer	$2399
NoteJet 4/25 180HD with Built-in Printer	2699

TEXAS INSTRUMENTS

TM4000E DX2/50 200HD Mono	$2897
TM4000 DX/25 120HD Mono	1879
TM4000 DX/25 200HD Mono	2175
TM4000E DX2/50 200HD Color	3285
TM4000E SX/25 120HD Color	2299

PRINTERS

OKIDATA

ML184 Turbo	$235	ML321	$414
ML380	205	ML521	485
ML320E	292	OL400E	499
ML520	363	ML591	559
ML590	414	OL850	1239

Panasonic

2023	$193	4430 Laser	$659
2180	165	2624	389
2123	232	3123	259
1654	579	3124	333
2124	304	3624	398

Canon

BJ230	$399	430 Laser	$589
BJ200	289	BJ10SX	254
BJC800	579		

EPSON

LX810	$169	LQ1170	$599
FX870	269	AP2250	119
FX1170	365	AP3250	179
LQ1070+	369	DFX5000	1339
LQ570+	245	DFX8000	2249
LQ870	449	Stylus800	269
LQ2550	889	ActionLaser 1500	649

Lexmark

PPSII 2380+ Narrow 9-Pin	$325
PPSII 2381+ Wide 9-Pin	449
PPSII 2390+ Narrow 24-Pin	325
Colorjet Printer PS	2599
4037 5E LED Printer	649
4039 Laser Model 16L	2699
4039 Laser Model 12R	1665
4039 PostScript 10RD	1799
4039 PostScript 10R	1339
ExecJet II 4076 Ink Printer	275

EH003

HARD DRIVES

CONNER

170MB 17MS 3.5" HH IDE	185
250MB 14MS 3.5" HH IDE	225
340MB 14MS 3.5" HH IDE	315
545MB 10MS 3.5" HH IDE	625
1.37GB 10MS 3.5" HH SCSI	999

Seagate

ST251-1 43MB 5.25" MFM	$236
ST3144A 131MB 3.5", IDE	168
ST3243A 214MB 3.5", IDE	207
ST3390A 341MB 3.5", IDE	325
ST3550A 452MB 3.5", IDE	439
ST41200N 1.05GB SCSI	959

Maxtor DRIVEN IN THE BEST

ALL NOVELL READY HARD DRIVES—CALL!

7213A 213HD IDE	$229
7345A 345HD IDE	295
MXT540A 540HD IDE	599
PO-12S 1.20GB SCSI	959

BOCA

BOCA IDE & I/O Controller 49

MODEMS & COMMUNICATIONS

US Robotics

14.4 External Sportster	$169
14.4 External Sportster/Fax	179
14.4 Internal Sportster	149
14.4 Internal Sportster/Fax	169
9600 External Sportster/Fax	159
9600 Internal Sportster/Fax	139
Worldport 9696 w/Fax	239
Worldport 14.4 w/Fax	259

PRACTICAL PERIPHERALS

2400 V 42bis w/9600 Fax Internal	$88
2400 V 42bis w/9600 Fax External	108
14.4 Internal V 42 bis w/Fax	176
14.4 External V.42 bis w/Fax	199
14.4 Send/Receive Pocket	325
9600 External w/Fax V.32	174
9600 Internal w/Fax V.32	164

Hayes

ACCURA 2400B Internal	$62
ACCURA 14.4 + Fax144 Internal	219
ACCURA 96 + Fax96 Internal	199
OPTIMA 14.4 + Fax14.4 Int./Ext.	369
OPTIMA 96 V.32 + Fax96 Int./Ext.	349

intel

Fax/Modem Series 14.4 Internal w/Fax	$169
Fax/Modem Series 14.4 External w/Fax	194
24/96 PCMCIA w/Fax Internal	189
96/96 PCMCIA w/Fax Internal	237
14.4/14.4 PCMCIA w/Fax Internal	285
100 INT 94	350 INT 257
200 INT 199	400 INT 288
300 INT 219	400E EXT 305

TAPE BACK-UP & MEDIA

JUMBO 120	$99
JUMBO 250	185
TRAKKER 120MB Portable	285
TRAKKER 250MB Portable	333
Powertape 2 0GB Internal	934
Powertape 2.0GB External	1089

iOMEGA

BERNOULLI PC Powered 90	$449
BERNOULLI PC Powered 90 Pro	499
BERNOULLI Insider 150	549
BERNOULLI Insider 90 Pro	449
TAPE 250MB Back-Up	199

SYDOS

Sydos Pro Note 42MB Parallel	$505
Sydos Puma 88MB Parallel	437
Sydos Marlin 105MB Int IDE	579
Sydos 88MB Ext. SCSI w/Adapter	583
Sydos 88MB Int. SCSI w/Adapter	492

3M

DC 2120XIMAT	$17
DC 600A	14
DC 6250 250MB	19
DC 6525	24
3.5" Diskettes DS/HD Fmt.	8
5.25" Diskettes DS/HD Fmt.	6
MAGNUS 1.2	34

BATTERY BACK-UPS

APS

BACKUP 250	$94	SMART 400	$295
BACKUP 400	154	SMART 600	349
BACKUP 450	185	SMART 900	549
BACKUP 600	254	SMART 9000	939
BACKUP 900	389	SMART1250	675
BACKUP 1250	485	SMART 2000	1175

BC 250	$92	OMNI 500 LAN	$242
BC 400	152	OMNI 600 LAN	279
BC 500	189	OMNI 750 LAN	374
BC 500 LAN	189	OMNI 900 LAN	449
BC 600 LAN	239	OMNI 1250 LAN	549
BC-750 LAN	279	LC 1200	125
BC-900 LAN	329	Power Mixer	49
BC-1250	439		

CD ROM & OPTICAL

SONY-CDU-56110	$369
SONY-CDU-7811110	499
NEC-CDR 400 3XP Portable	445
NEC-CDR 500 3XI Portable	492
NEC-CDR 600 3XE Portable	586
TEXEL-CD ROM Int-Kit	439
TEXEL-CD ROM Ext-Kit	514
TEXEL-CD Multimedia Business Bundle	999
CHINON CD535 Kit Int.	399
CHINON CD535 Kit Ext.	499

MEMORY UPGRADES

VALUELINE STOCKS KINGSTON & VIKING MEMORY FOR EVERY COMPUTER. PRICES CHANGE, SO CALL US FOR YOUR BEST PRICE!

FAX MACHINES

Panasonic PX-150 w/cutter	$429
Canon Fax 17A	375
Canon Fax 16	299
Canon Fax 50 w/cutter	399
Sharp Fax 4x-184 w/cutter	349
Hewlett-Packard Fax 900 InkJet	775

MULTIMEDIA, SOUND & CD'S

Pro-Audio Spectrum 16	$169
Double Fusion CD Kit	547
Pro-Audio 16 Basic	129

CREATIVE

Sound Blaster Deluxe	$79
Sound Blaster Pro-Deluxe	115
Sound Blaster MCD 16	149
Sound Blaster SCSI 16	189
Sound Blaster MCD ASP	199
Sound Blaster SCSI ASP	199

Labtec

Labtec CS 150 Speakers	$19
Labtec SS 700 Speakers	36
Labtec CS 550 Speakers	29
Labtec CS 180 Shielded Speakers	24
Labtec CS 1000 Stereo Speakers	79

ACS 200 Speakers	$199
ACS 300 Speakers	285
ACS 50 Speakers	74
ACS 100 Speakers	126
AC10 Computer Audio Controller	179

TURTLE BEACH

Turtle Beach Multisound	$499
Wave Card Synthesizer	154

Sound Galaxy BXII	$59
Sound Galaxy NX Pro 16	159
Sound Galaxy NX Pro-Extra 8	119

VGA MONITORS

NEC

NEC Multisync 2A	$299
NEC Multisync 5FGE	1079
NEC Multisync 6FGP	2499
NEC 14" SVGA .28DP	349

SONY

Sony 14" VGA .25DP CDP1320	$349
Sony 14" Multiscan MDL 1430	599
Sony 17" Color .25DP MDL 1730	999
Sony 1730SE 17" VGA	1199
Sony 20" Multiscan MDL 2036	2080

LEADING EDGE

Leading Edge 14" VGA .42DP	$199
Leading Edge 14" EVGA .39DP	239
Leading Edge 14" EVGA .28DP	279
Leading Edge 14" EVGA .28DP NI	299
Packard Bell 14" SVGA .39DP	$249
Packard Bell 14" EVGA .28DP	329
Panasonic 14" SVGA .28DP	329
Samtron 14" VGA Mono Flat	129
Samtron 14" VGA .28DP	319

NETWORKING

NetWare Version 4.01

5 User 3.5"	$875	100 User 3.5"	$2685
10 User 3.5"	1095	250 User 3.5"	3945
25 User 3.5"	2075	500 User 3.5"	16,795
50 User 3.5"	3999	1000 User 3.5"	30,516

NetWare Version 3.12

5 User 3.5"	$599	50 User 3.5"	$2540
10 User 3.5"	1375	100 User 3.5"	3488
25 User 3.5"	1980		

NetWare Version 3.11

5 User 3.5"	$535	50 User 3.5"	$2448
10 User 3.5"	1229	100 User 3.5"	3480
25 User 3.5"	1732	250 User 3.5"	6380

SFTIII Version 3.11

5 User	$1534	50 User	$4595
10 User	2382	100 User	8599
25 User	3166	250 User	11396

National Ethernet 16-Bit	$85
National Ethernet 10-Bit	112
National Ethernet 16-Bit BNC	212
NE1000 Ethernet Coax Card	96
NE 2000 plus Ethernet Coax Card	105
NE3200 EISA Ethernet Coax Card	525

intel

Intel EtherExpress 16	$95
Intel EtherExpress 16C	119
Intel EtherExpress Flash	119

SMC

ULTRA 16-Bit Ethernet 10BT/Coax	$104
ULTRA 16 Combo	121
PC-130 8-Bit ArcNet	67
PC-130E ArcNet Coax	97
Ethercard + Elite 8-bit Coax	94
Ethercard + Elite Coax/10BT	118

3Com

3C503 Etherlink II 8-Bit Coax	$189
3C503 Etherlink Coax	157
3C503 Etherlink II 10BT	172
3C509 Etherlink III Coax	123
3C509 Etherlink III 10BT	129
3C509 Etherlink III MCA 10BT	238
3C579 Etherlink EISA Coax/10BT	226

VGA BOARDS

ATI Graphics Ultra Pro EISA2MB	$389
ATI Graphics Ultra +2MB	235
Hercules HG210 Graphite w/1MB	222
Hercules D301 Dynamite Pro ISA	164
Hercules D302 Dynamite Pro ISA	226
BOCA Super VGA w/512K	69
BOCA Super Accelerator w/1MB	119
BOCA Local Bus SXVGA w/1MB	126
BOCA Local Bus SXVGA w/2MB	184
BOCA Vortek VRAM w/2MB 16-Bit	229
Orchid Fahrenheit 1280+	147
Orchid Celcius VLB 1MB	215

WYSE TERMINAL

WYSE 30 Amber or Green	$274
WYSE 55 Amber or Green	349
WYSE 60 Amber, Green or White	374
WYSE 150 Amber, Green or White	346
WYSE 160 Amber, Green or White	407
WYSE 185 Amber, Green or White	319
WYSE 325 Color	849
WYSE 370 Color	952

SPECIAL ORDER SERVICE

CORPORATE ACCOUNTS

FAST DELIVERY

CONVENIENT HOURS

(800) 700-1000

IN ILLINOIS (708) 933-1100

CIRCLE 343 ON READER SERVICE CARD

TI
AST
NEC
CANON
COMPAQ
TOSHIBA

Shop and Compare Before You Buy

Don't Settle for Less	PCs Compleat	Supplier 2	Supplier 3
Guaranteed Lowest Price	YES		
The Best Brand Names	YES		
30-day Money Back Guarantee	YES		
Never a Restocking Fee	YES		
30-day Price Protection	YES		
PC Computing Five Star Award	YES		
Lifetime *Toll-Free* Technical Support	YES		
FREE Hardware Configuration	YES		
FREE Software Installation	YES		
Same Day Shipment	YES		
Pre-Installed Software Discount	YES		
All Major Credit Cards Accepted	YES		
Never a Hidden Surcharge	YES		
$4.95 Shipping on Most Peripherals	YES		
Compaq Authorized for Direct Marketing	YES		
90 Days Same As Cash	YES		
Low Cost Business Leases	YES		
Volume Purchase Agreements	YES		
FREE Asset Tagging	YES		
Customer Satisfaction Is Top Priority	YES		

DIRECT TOP FORTY
PC Computing
FIVE STAR AWARD

PCs Compleat is the proud recipient of PC/Computing magazine's highest Five Star rating for service and overall performance in its listing of the nation's leading direct sellers

PCs COMPLEAT
THE BEST: BRANDS · PRICE · DELIVERY · SERVICE

NEW SALES HOURS:
Monday-Friday 7 A.M. E.T. - Midnight
Weekends & Holidays 10 A.M.- 8 P.M.

TOLL-FREE SALES
1-800-775-4727

ZENITH DATA SYSTEMS
A Bull Company

$1629*

Z-LITE 425L Subnotebook

Hard Drive	Price
120MB	$1999
170MB	$2369

Lease for $73.36/mo.

Z-STAR 433VL

Screen	Hard Drive	Price
Mono	170MB	$1629*
Dual Scan	200MB	$2299

Lease for $59.78/mo.

Z-LITE

Z-NOTE+

Processor	Screen	Hard Drive	Price
486SL/33	Mono	200MB	$2594
486SL/33	Active	200MB	$4199

Zenith Data Systems Accessories

Port replicator for Z-NOTE+	$79.99
Numeric keypad for Z-NOTE+	$69.99
Extra battery for Z-NOTE+	$149.99
Extra battery for Z-STAR	$129.99
Extra battery for Z-LITE	$149.99

TEXAS INSTRUMENTS

$1869*

TravelMate 4000E Monochrome

Processor	Hard Drive	Price
486SX/25	120MB	$1869*
486DX2/50	200MB	$2699

Lease for $68.69/mo.

TravelMate Accessories

TI Intelligent Docking Station	$799.99
External Battery Charger	$129.99
Deluxe Carrycase	$56.99
Ethernet Adapter	$449.99

4000E Color

TravelMate 4000E Color

Processor	Screen	Price
486SX/25	Enhanced Color	$2099
486DX2/40	Enhanced Color	$2699
486DX2/50	Dual Scan	$3289
486DX2/50	Active Matrix	$3799

Lease for $77.03/mo.

Canon

$2399*

Notejet Computer

- 2 PCMCIA Type II Slots
- Built-in Inkjet printer:
- 360dpi resolution
- Automatic sheet feeder included

Processor	Hard drive	Price
486SLC25	135MB	$2399*
486SLC25	180MB	$2599

Notejet

Bubblejet Printers

BJ10sx-portable 110cps, 3.7lbs.	$259.99
BJ200, desktop, 248cps	$299.99
BJ230, 11"x17" capacity	$419.99
BJC600, Color inkjet 360dpi	$589.99

2 year warranty included

LEADING EDGE

$969*

VL Bus Desktops

Processor	Hard drive	Price
486SX/25	170MB	$969*
486SX/33	170MB	$1019
486DX/33	260MB	$1259
486DX2/50	345MB	$1619
486DX2/66	345MB	$1789

*VGA color monitors begin at $229.99

Lease for $50/mo.

VL Bus Desktop

VL Bus Minitowers

Processor	Hard drive	Price
486DX/33	260MB	$1379*
486DX2/50	345MB	$1729
486DX2/66	345MB	$1899

*VGA color monitors begin at $229.99

WinPro 486SLC Series

Processor	Hard drive	Monitor	Price
486SLC/33	120MB	14" VGA	$989
486SLC/33	170MB	14" SVGA	$1099

Compleat Your System With These Great Peripherals

Okidata
Laser Printers

OL400e, 4PPM, 300dpi, Energy Star	$499.99
OL410e, 4PPM, 600dpi class output	$699.99

Epson
Inkjet Printers

Stylus 300, Thermal inkjet, 4 fonts	$249.99
Stylus 800, 360dpi, 100 sheet feeder	$299.99

Laser Printers

Action Laser1000, 6PPM	$629.99
Action Laser1500, 6PPM	$649.99

SONY
Trinitron MultiScan Monitors

14", 1024x768, .25mm aperture	$559.99
17", 1024x768, Digital Image	$1049.99
17", 1600x1200, Dynamic Focus	$1199.99
20", 1280x1024, 30mm aperture	$2279.99

Multimedia Bundles

Desktop Library Upgrade Kit	$459.99
CD-ROM drive, Internal, 2X, SCSI	$319.99

Hayes

Accura 14.4 + FAX Int	$189.99
Accura 14.4 + FAX Ext	$229.99
Optima 288 V.FC + FAX	$449.99
Optima 144+ FAX PCMCIA	$299.99
Optima 96 PCMCIA	$119.99

3COM

3C509 Etherlink III Coax	$119.99
3C509 Etherlink III 10BT	$129.99

Intel

EtherExpress 16 Coax	$109.99
EtherExpress 16 10BT	$109.99

Xircom

CE-10BT PCMCIA Ethernet 10BT	$279.99
CE-10B2 PCMCIA Ethernet Coax	$279.99
PE3-10BT Pocket Ethernet 10BT	$279.99
PE3-10B2 Pocket Ethernet Coax	$279.99

MiniStor

PCMCIA, 42MB drive, Type III	$469.99
PCMCIA, 85MB drive, Type IV	$519.99
PCMCIA, 128MB drive, Type IV	$629.99
DockIt Socket, Drive Adapter	$209.99

Colorado
Tape drives

Jumbo 120MB, Internal	$109.99
Jumbo 250MB, Internal	$179.99
Trakker 120MB, External	$219.99
Trakker 250MB, External	$349.99

New Media

Visual Media SCSI PCMCIA Adapter	$219.99
WAVjammer PCMCIA sound card	$279.99
Bus Toaster SCSI-2 PCMCIA Adapter	$269.99

XJACK 14.4/14.4
$329.99

Model	Price
XJ1144 14.4/14.4	$329.9
XJ196FM 96/96	$279.9
XJ124FM 24/96	$209.9
CC3144/14.4/14.4	$299.9
CC396FM 96/96	$269.9
CC324FM 24/96	$199.9

Megahertz

BRANDS · PRICE · The BEST · DELIVERY · SERVICE

© PCs Compleat. All prices subject to change and do not include shipping. Monitors sold separately. Lease prices reflect 36 month operating lease to approved business customers. All products or brand names are trademarks of their respective companies. PCs Compleat, 34 St. Martin Drive, Marlborough, MA 01752. Phone (508) 480-8500. Not responsible for typographical errors

Toshiba Direct

Portégé T3400

- ▲ Ultra-portability at only 4.1 lbs. (4.4 lbs. for color) and 9.9"W x 7.9"D x 1.7"H
- ▲ 486SX/33 processor
- ▲ 120MB hard drive
- ▲ 4MB RAM, expandable to 20MB
- ▲ PCMCIA Type II slot
- ▲ External 3.5" disk drive
- ▲ Integrated AccuPoint™ pointing device

Screen	Price
Monochrome	$2259*
Active color	$3469

Lease for $82.91/mo.*

T3400 Mono

$2259*

T4700

- ▲ 486DX2/50 processor
- ▲ 8MB RAM, expandable to 24MB
- ▲ Brilliant 9.5" display with local bus video
- ▲ 2 PCMCIA slots (1 Type II, 1 Type III)
- ▲ Microsoft Sound System, built-in microphone, audio out port
- ▲ MS-DOS, Windows 3.1, UltraFont & Indeo video compression software

Screen	Hard drive	Price
Dual scan color	200MB	$3999*
Dual scan color	320MB	$4329
Active color	200MB	$4599
Active color	320MB	$4949

Lease for $146.76/mo.

$3999*

T4700 Dual Scan

T1950

- ▲ 4MB RAM, expandable to 20MB
- ▲ 9.5" display
- ▲ Type III PCMCIA slot
- ▲ 82-key keyboard
- ▲ MS-DOS 6.0, Windows 3.1
- ▲ Ballpoint mouse 2.0 with Quickport
- ▲ Enhanced power management

Model	Screen	Hard drive	Price
T1950 486DX2/40	Monochrome	120MB	$1899
T1950 486DX2/40	Monochrome	200MB	$2099
T1950 486DX2/40	Dual scan color	120MB	$2499
T1950 486DX2/40	Dual scan color	200MB	$2719
T1950 486DX2/40	Active color	120MB	$2849
T1950 486DX2/40	Active color	200MB	$3069
T1950 486DX2/40	Active color	320MB	$3399

Lease for $69.69/mo.

$1899*

T4600

- ▲ 33MHz 486SL processor
- ▲ 4MB RAM, expandable to 20MB
- ▲ 9.5" display
- ▲ 2 PCMCIA slots (1 Type I, 1 Type IV)
- ▲ Ballpoint mouse with QuickPort
- ▲ MS-DOS 6.0, Windows 3.1

Screen	Hard drive	Price
Monochrome	120MB	$2249*
Monochrome	200MB	$2297
Active color	120MB	$3889
Active color	200MB	$4099
Active color	320MB	$4449

Lease for $82.53/mo.

$2249*

T6600

- ▲ 486DX2/66 processor
- ▲ 8MB RAM, expandable to 40MB
- ▲ 510MB hard drive
- ▲ 10.4" active color display
- ▲ 16mm PCMCIA slots
- ▲ 2 full-length 16-bit ISA slots
- ▲ Detachable 101-key keyboard
- ▲ 2 built-in stereo speakers
- ▲ Microsoft Sound System
- ▲ MS-DOS 6.0, Windows 3.1, Asymetrix COMPEL and MediaBlitz

Model	Description	Price
T6600C	Base model	$6289*
T6600C/CD	Base model/Toshiba 2X CD-ROM drive	$6799
T6600C/CDV	Base model+CD-ROM+ Mambo DVI board	$7859

Lease for $230.80/mo.

$6289*

Desk Station IV

Toshiba's Desk Station IV turns your T4400, T4500, T4600, and T4700 into a full-function desktop computer by providing:

- ▲ 2 full-size, 16-bit industry standard expansion slots
- ▲ 5.25" half-height drive bay
- ▲ Parallel, serial, PS/2 mouse, VGA monitor, 101-key keyboard ports and 1 floppy disk drive port
- ▲ Separate monitor stand
- ▲ Monitor, notebook and keyboard extra

$599.99

TOSHIBA

PCs COMPLEAT

THE BEST: BRANDS · PRICE · DELIVERY · SERVICE

NEW SALES HOURS:
Monday-Friday 7 A.M. E.T. - Midnight
Weekends & Holidays 10 A.M. - 8 P.M.

TOLL-FREE SALES

1-800-775-4727

CIRCLE 238 ON READER SERVICE CARD

Texas Instruments

TravelMate: The Industry's Lone Star

4000E WinSX/25

- ▲ 486SX/25 processor
- ▲ 4MB RAM expandable to 20MB
- ▲ 10" monochrome display
- ▲ 120MB hard drive
- ▲ Enhanced high-speed video
- ▲ 4mm full travel keyboard
- ▲ MS BallPoint with QuickPort
- ▲ MS DOS 6.0, Windows 3.1

Lease for $68.59/mo.

$1869*

4000E WinSX/25 Color

- ▲ 486SX/25 processor
- ▲ 4MB RAM expandable to 20MB
- ▲ 8.2" enhanced color display
- ▲ 120MB hard drive
- ▲ Enhanced high-speed video
- ▲ 4mm full travel keyboard'
- ▲ MS BallPoint with QuickPort
- ▲ MS DOS 6.0, Windows 3.1

Lease for $77.03/mo.

$2099*

4000E WinDX2/50

- ▲ 486DX2/50 processor
- ▲ 4MB RAM expandable to 20MB
- ▲ 10" monochrome display
- ▲ 200MB hard drive
- ▲ Enhanced high-speed video
- ▲ 4mm full travel keyboard
- ▲ MS BallPoint with QuickPort
- ▲ MS DOS 6.0, Windows 3.1

Lease for 99.05/mo.

$2699*

4000 WinDX2/40 Color

- ▲ 486DX2/40 processor
- ▲ 4MB RAM expandable to 20M
- ▲ 8.2" enhanced color display
- ▲ 200MB hard drive
- ▲ Enhanced high-speed video
- ▲ 4mm full travel keyboard
- ▲ MS BallPoint with QuickPort
- ▲ MS DOS 6.0, Windows 3.1

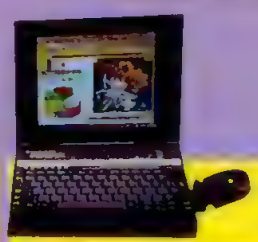
Lease for $99.05/mo.

$2699*

4000 WinDX2/50 Dual Scan Color

- ▲ 486DX2/50 processor
- ▲ 4MB RAM expandable to 20MB
- ▲ 9.4" dual scan color display
- ▲ 200MB hard drive
- ▲ Enhanced high-speed video
- ▲ 4mm full travel keyboard
- ▲ MS BallPoint with QuickPort
- ▲ MS DOS 6.0, Windows 3.1

Lease for $108.20/mo.



$3289*

4000E WinDX2/50 Active Matrix

- ▲ 486DX2/50 processor
- ▲ 4MB RAM expandable to 20MB
- ▲ 8.4" active matrix color display
- ▲ 200MB hard drive
- ▲ Enhanced high-speed video
- ▲ 4mm full travel keyboard
- ▲ MS BallPoint with QuickPort
- ▲ MS DOS 6.0, Windows 3.1

Lease for $124.98

$3799

PCs COMPLEAT

THE BEST: BRANDS · PRICE · DELIVERY · SERVICE

NEW SALES HOURS:

Monday-Friday 7 A.M. E.T. - Midnight
Weekends & Holidays 10 A.M. - 8 P.M.

TOLL-FREE SALES

1-800-775-4727

TravelMate Intelligent Docking System

- ▲ Instantly transforms your TravelMate notebook into a full-sized, full-featured 486 desktop PC
- ▲ 6 16-bit expansion slots
- ▲ 2 PCMCIA Type III slots
- ▲ 4 internal drive bays- EPP parallel, 2 serial, VGA, mouse,keyboard, RJ-11 jack and game ports
- ▲ Designed for all TravelMates with QuickPort connectors

$799.99

TEXAS INSTRUMENTS

PC MAGAZINE EDITORS' CHOICE
WinDX2/50
August 1993

PC MAGAZINE EDITORS' CHOICE
WinSX/25
August 1993

PC MAGAZINE EDITORS' CHOICE
WinSX/25 Color
August 1993

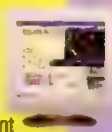
NEC: Ready and VERSAtile...

NEC Technologies, Inc. is a leading manufacturer of computers and peripherals for the North American market. Ready and Versatile, NEC desktops, multimedia desktops, and notebooks offer a host of options. The NEC product line includes the new UltraLite Versa E series of notebooks, Ready line of desktops, award-winning MultiSync monitors, Silentwriter laser printers, and the new triple-speed MultiSpin CD-ROM drives.

MultiSync Monitors

View the latest in the line of award-winning monitors, which include a 3-year warranty!

3V



- ▲ 15" SVGA
- ▲ 1024x768, .28mm ni
- ▲ 72MHz VESA refresh rate
- ▲ MPR II, EnergyStar compliant
- ▲ Great for Entry-level business/ Windows applications

$519.99

5FGp

- ▲ 17" SVGA
- ▲ 1280x1024, .28mm ni
- ▲ Opticlear surface
- ▲ Intelligent Power Management System (IPM)
- ▲ Great for entry-level CAD, color desktop publishing

$1359.99

6FGp

- ▲ 21" SVGA
- ▲ 1280x1024, .28mm ni
- ▲ Opticlear surface
- ▲ Intelligent Power Management System (IPM)
- ▲ Great for professional CAD/CAM/CAE, graphic design, color desktop publishing

$2369.99

UltraLite Versa E

For ease of upgrade, the Versa E's floppy drive, hard disk drive and memory card slide in and out of their storage slots. For example increase your hard disk storage from 120MB to 250MB by just sliding the components in and out. If you require extended battery life, slide out the Versa's floppy drive, pop in a second battery, and double your time on the road. Also the Versa E incorporates two Type II PCMCIA slots to add industry standard communications options such as a modem or cellular and local area network products. And, in response to customer requests, the new Versa E series features the front-mounted VeraTrack integrated trackball, a smaller AC adapter, lightning fast Accelerated Local Bus video and a brighter color screen.

NEC

Versa E

Ready Multimedia

NEC MultiSpin 3X CD-ROM Drives

New from NEC— the fastest CD-ROM Drives available

- ▲ Triple speed 450Kb/sec transfer rate, 195ms access time & 256K buffer
- ▲ MPC Level 2 compliant, Multisession Photo CD & XA-compliant
- ▲ Sleek new design features front panel LCD controls for display of data, audio & diagnostics data
- ▲ Full audio control buttons (play, repeat, track advance, pause, stop) on front panel for your music CDs. And play audio CDs without a PC.

MultiSpin 3Xp Portable Drive	**$429.99**
MultiSpin 3XI Internal Drive	**$479.99**
MultiSpin 3Xe External Drive	**$569.99**

UltraLite Versa E

- ▲ 486 processor
- ▲ 4MB RAM, expandable to 20MB
- ▲ 2 Type II PCMCIA slots
- ▲ MS-DOS 6.2, Windows 3.1, built-in trackball

Processor	Screen	Hard drive	Price
DX2/40	Monochrome	120MB	$2579*
DX2/40	Monochrome	250MB	$2989
DX2/40	Active color	120MB	$3819
DX2/40	Active color	250MB	$4229
DX2/50	Monochrome	209MB	$3259
DX2/50	Monochrome	340MB	$3669
DX2/50	Active color	209MB	$4499
DX2/50	Active color	340MB	$4919

Lease for $94.65/mo.

$2579*

Ready Desktops

- ▲ 4MB RAM, expandable to 36MB
- ▲ 3.5" floppy drive
- ▲ 9600/4800 fax, 2400 data modem*
- ▲ Local bus graphics
- ▲ MS-DOS 6.0, Windows 3.1, PFS: Window Works, America-On-Line, CompuServe

Processor	Hard drive	Price
486SX/25*	170MB	$999*
486SX/33	210MB	$1249
486DX2/66	250MB	$1739

**486SX/25 does not include modem*

NEC SVGA color monitor $319.99

Lease for $50/mo.

$999*

Ready Mutimedia Desktops

- ▲ *Includes features of standard desktops plus.*
- ▲ Fast double or triple speed CD-ROM drives
- ▲ MediaVision 16-bit stereo sound
- ▲ Labtec speakers, headphone, and microphone
- ▲ MS-DOS 6.0, Windows 3.1, America-On-Line, CompuServe
- ▲ CD-ROM titles include: PFS: Window Works, Compton's Encyclopedia, Dinosaur Adventure and Space Adventure

Processor	Hard drive	Price
486SX/25	170MB	$1499*
486SX/33	250MB	$1899

Lease for $55.01/mo.

$1499*

PCs COMPLEAT

THE BEST: BRANDS · PRICE · DELIVERY · SERVICE

Monday-Friday 7 A.M. E.T. - Midnight
Weekends & Holidays 10 A.M. - 8 P.M.

TOLL-FREE SALES

1-800-775-4727

CIRCLE 092 ON READER SERVICE CARD

Compaq Compleat

COMPAQ LTE Lite 4/25

- 486SL/25 processor
- 4MB RAM expandable to 20MB
- 9.5" display
- MS DOS 6.0, Windows 3.1, trackball
- 3-year warranty

Screen	Hard Drive	Price*
Mono	120MB	$1999
Mono	209MB	$2199
Active Mono	120MB	$2799
Active Mono	209MB	$3099

Lease for $73.36/mo.

COMPAQ Contura 4/25

- 486SL/25 processor
- 4MB RAM expandable to 20MB
- 209MB hard drive
- 9.5" display
- MS DOS 6.0, Windows 3.1, trackball
- 3-year warranty

Screen	Price*
Mono	$2199
Dual Scan	$2879*
Active Matrix	$3449

Lease for $80.70/mo.

COMPAQ Concerto

- 4MB RAM expandable to 20MB
- 9.5" mono display
- 2 TYPE II or 1 Type III PCMCIA slots
- Untethered intelligent pen
- Integrated, detachable keyboard
- MS DOS 6.0, Windows 3.1, InkWare NoteTaker,
- PenPower for Excel

Processor	Hard Drive	Price*
486SL/25	120MB	$2359
486SL/25	250MB	$2649
486SL/33	250MB	$2929

Lease for $86.57/mo.

COMPAQ Monitors

14" SVGA, 1024x768i, .28mm	**$349.99**
14" SVGA, 1024x768ni, .28mm	**$399.99**
15" SVGA, 1024x768ni, .28mm	**$499.99**

COMPAQ

120MB Prolinea $1109

Dual Scan Contura $2879

120MB Concerto $2359

COMPAQ ProLinea Desktops

- 4MB RAM expandable to 32MB
- 3.5" floppy drive
- Local bus graphics
- COMPAQ mouse
- MS DOS 6.0, Windows 3.1

Processor	Hard Drive	Price
486SX/33	120MB	$1109
486SX/33	240MB	$1259
486DX/33	120MB	$1389
486DX/33	240MB	$1469
486DX/33	340MB	$1619

Lease for $50/mo.

ProLinea Bundles also include:

- 5.25" floppy drive
- Modem
- PFS: WindowWorks, Prodigy

Processor	Hard Drive	Price*
486DX/33	120MB	$1469
486DX/33	240MB	$1559
486DX2/66	340MB	$1979

**Monitors sold separately*

Lease for $53.91/mo.

COMPAQ ProLinea MT

- 4/8MB RAM expandable to 64MB
- 8KB cache expandable to 128KB
- 3.5" floppy drive
- Local bus graphics
- 5 expansion slots, 5 drive bays
- COMPAQ mouse
- MS DOS 6.0, Windows 3.1, TabWorks

Processor	RAM	Hard Drive	Price
486SX/33	4MB	270MB	$1399
486SX/33	4MB	340MB	$1499
486DX2/66	8MB	525MB	$2469

Lease for $51.34/mo.

ProLinea Net1

- 486SX/25 processor
- 4MB RAM expandable to 20MB
- 3.5" floppy drive
- 100MB hard drive
- Integrated 14" .28mm color monitor
- Integrated ethernet network interface
- EPA Energy Star Certified
- COMPAQ mouse
- MS-DOS 6.0, Windows 3.1, TabWorks

$1329

Lease for $50/mo.

COMPAQ DeskPro/M

- 8MB RAM expandable to 64MB
- 3.5" floppy drive
- 4 32-bit EISA expansion slots
- Intelligent modularity
- QVision graphics controller
- COMPAQ mouse
- MS DOS 6.0, Windows 3.1

Processor	RAM	Hard Drive	Price
486DX/33	8MB	240MB	$2659
486DX/33	8MB	340MB	$3069
486DX2/66	8MB	510MB	$3739

Lease for $97.58/mo.

PCs COMPLEAT

THE BEST: BRANDS · PRICE · DELIVERY · SERVICE

Monday-Friday 7 A.M. E.T. - Midnight
Weekends & Holidays 10 A.M.- 8 P.M.

TOLL-FREE SALES

1-800-775-4727

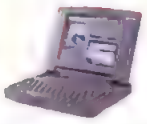
NEC

$2579*

UltraLite Versa E

Processor	Screen	Hard drive	Price
DX2/40	Monochrome	120MB	$2579*
DX2/40	Monochrome	250MB	$2989
DX2/40	Active color	120MB	$3819
DX2/40	Active color	250MB	$4229
DX2/50	Monochrome	209MB	$3259
DX2/50	Active color	209MB	$4499
DX2/50	Active color	340MB	$4919

Lease for $94.65/mo.



Versa E color

Ready Multimedia Desktops

- ▲ 4MB RAM, expandable to 36MB
- ▲ Double or triple speed CD-ROM drive
- ▲ MediaVision 16-bit stereo sound
- ▲ 9600/4800 fax, 2400 data modem

Processor	Hard drive	Price
486SX/25	170MB	$1499*
486SX/33	250MB	$1899

Lease for $55.01/mo.

AST

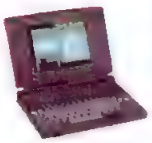
$1729*

Bravo NB

- ▲ 486SX/25 processor
- ▲ Accelerated local bus graphics
- ▲ PCMCIA Type III slot

Screen	Model	Hard Drive	Price
Mono	123W	120MB	$1729*
Mono	173W	170MB	$1799
Dual scan	123W	120MB	$2279
Dual scan	173W	170MB	$2399
Active matrix	173W	170MB	$2999

Lease for $63.45/mo.



Bravo NB

PowerExec

Model	Screen	Price
4/25SL Model 203/W	Mono	$2399
4/25SL Model 203/W	Active color	$4029
4/33SL Model 203/w	Monochrome	$2629
4/33SL Model 203/W	Active color	$4229
4/33SL Model 343/W	Active Matrix	$4629

Lease for $88.04/mo.

AST

$999*

Bravo LC

- ▲ 4/8MB RAM exp. to 64MB
- ▲ 120/170/210MB hard drive

Model	Hard Drive	Price*
4/25s Model 123W	120MB	$999
4/33 Model 123W	120MB	$1299
4/33 Model 173W	170MB	$1359
4/33 Model 213W	210MB	$1539
4/66d Model 213W	210MB	$1979

Monitors sold separately

Lease for $50/mo.

Bravo LC

Bravo MT

Model	Hard Drive	Price*
4/33 Model 3	Optional	$1239
4/33 Model 173W	170MB	$1519
4/33 Model 343W	340MB	$1979
4/66d Model 3	Optional	$1659
4/66d Model 173W	170MB	$1929
4/66d Model 343W	340MB	$2399

Monitors sold separately

Lease for $50/mo.

Cygnet

$2149*

Desktop Systems

- ▲ 450MB hard drive
- ▲ Double-speed CD-ROM
- ▲ MS-DOS, Windows, mouse

RAM	Video	Price
8MB	20M-Wm	$2149*
16MB	20M-Wm	$2479
16MB	60M-Wm	$2699

Lease for $78.87/mo.

Desktop

Tower Systems

ISA/EISA	Video	Price
ISA	20M-Wm	$2149
ISA	60M-Wm	$2699
EISA	20M-Wm	$2879
EISA	60M-Wm	$3099

Includes 16MB RAM

15" SVGA color monitor $399.99

Compleat Your System With These Great Peripherals

Software

Lotus SmartSuite Upgrade	$289.99*/$314.99
Lotus SmartSuite	$374.99*/$449.99
Lotus 1-2-3	$259.99*/$294.99
Lotus 1-2-3 Upgrade	$99.99
Lotus Organizer	$74.99*/$99.99
WinFax Pro	$59.99*/84.99
LapLink V	$69.99*/$109.99
Norton Utilities 7.0	$79.99*/$119.99
Norton AntiVirus 3.0	$59.99*/$89.99
Norton Desktop f/Win 3.0	$79.99*/$119.99
PFS:WindowWorks	$39.99*/$84.99

*Special price available when purchased with a system

Microsoft Office Version Upgrade	$249.99
Microsoft Office Competitive Upgrade	$289.99
Microsoft Office	$449.99
Microsoft Word 6.0 f/Win	$294.99
Microsoft Encarta CD-ROM	$89.99
Quattro Pro f/Win	$39.99
WordPerfect 6.0 f/Win	$279.99
WordPerfect 6.0 f/Win Version Upgrade	$99.99

Multimedia

Creative Labs Discovery Kit	$449.99
Creative Labs Edutainment 16	$519.99
ProAudio Spectrum 16 sound card	$159.99
SoundBlaster 16 SCSI ASP sound card	$224.99
Labtec CS-150 stereo speakers	$19.99

Logitech

Scanners

ScanManEasytouch, portable	$229.99
ScanMan256, gray scale w/OmniPage	$219.99
ScanMan Color, hand-held	$449.99
ScanMan256, gray scale w/Catchword	$299.99

Panasonic

Dot Matrix Printers

KX-P1124I	$239.99
KX-P2123	$234.99
KX-P2124	$317.99
KX-P1624	$414.99
KX-P2624	$439.99

NEC

MultiSync Monitors

SVGA, 14", MPRII	$319.99
3V, 15" EnergyStar	$519.99
4FGe, 15", AccuColor	$689.99
5FGe, 17", Energy Star	$1069.99
5FGp, 17", 1280x1024	$1359.99
6FGp, 21", Opticlear Surface	$2369.99

MultiSpin CD-ROM Drives

MultiSpin 3Xp Portable Drive	$429.99
MultiSpin 3Xi Internal Drive	$479.99
MultiSpin 3Xe External Drive	$569.99

Practical Peripherals

14.4/14.4 internal, PM14400FX	$169.99
14.4/14.4 external, PM14400FXMT	$189.99
96/69 internal, PM9600FX	$149.99
96/96 external, PM9600FXMT	$159.99
14.4/14.4 pocket, PM14400FXPPM	$299.99
14.4/14.4 PCMCIA, PRACTICARD144	$299.99

CIRCLE 268 ON READER SERVICE CARD

Luxurious Leather

$99.99

- Padded computer section with divider
- 3 section compartment for files
- Pockets for disks, pens, & business cards
- External pocket 13"x 9"x2"

Also from Targus

Business Traveler	$199.99
Premier Leather	$149.99
Business Commuter	$124.99
Universal Case	$69.99
Notepac (5 colors)	$39.99

TARGUS

Lifetime Replacement Warranty

PCM-3/94A

TI
AST
NEC
CANON
COMPAQ
TOSHIBA

Shop and Compare Before You Buy

Don't Settle for Less	PCs Compleat	Supplier 2	Supplier 3
Guaranteed Lowest Price	YES		
The Best Brand Names	YES		
30-day Money Back Guarantee	YES		
Never a Restocking Fee	YES		
30-day Price Protection	YES		
PC Computing Five Star Award	YES		
Lifetime *Toll-Free* Technical Support	YES		
FREE Hardware Configuration	YES		
FREE Software Installation	YES		
Same Day Shipment	YES		
Pre-installed Software Discount	YES		
All Major Credit Cards Accepted	YES		
Never a Hidden Surcharge	YES		
$4.95 Shipping on Most Peripherals	YES		
Compaq Authorized for Direct Marketing	YES		
90 Days Same As Cash	YES		
Low Cost Business Leases	YES		
Volume Purchase Agreements	YES		
FREE Asset Tagging	YES		
Customer Satisfaction is Top Priority	YES		

DIRECT TO YOU PC COMPUTING FIVE STAR AWARD

PCs Compleat is the proud recipient of PC/Computing magazine's highest Five Star rating for service and overall performance in its listing of the nation's leading direct sellers

PCs COMPLEAT

THE BEST: BRANDS · PRICE · DELIVERY · SERVICE

NEW SALES HOURS:
Monday-Friday 7 A.M. E.T. - Midnight
Weekends & Holidays 10 A.M. - 8 P.M.

TOLL-FREE SALES

1-800-775-4727

preparing the color separations for production. While we've been working primarily with Aldus PageMaker and CorelDRAW, we understand that there are graphics programs written specifically for textile designs. Do you have any information about them?

Marcos J. Capelossi
Amparo, Brazil

▶PC MAGAZINE: There are a number of textile-design programs on the market. Like all vertical-market products, these programs offer specialized functions not found in off-the-shelf software. In addition, turnkey systems are available that include both hardware and software. Naturally, the price you pay will reflect the amount of extra functionality and system integration provided.

Textile CAD (computer-aided design) systems typically address one, two, or all three of the following tasks: pattern creation, presentation and marketing materials, and color separations. Although the term CAD is normally associated with vector-based programs, most textile CAD programs are raster-based. As a result, they tend to have more in common with image-editing programs, such as Adobe PhotoShop or Micrografx's Picture Publisher, than they do with AutoCAD or with the CorelDRAW and PageMaker programs you're currently using.

Like other image-editing programs, all textile CAD programs support scanners, 256-color indexed palettes, and a variety of paint brushes. Unlike off-the-shelf image-editing programs, however, textile CAD programs offer sophisticated repeat functions and efficient color remapping. For example, PrimaVision, from CadTex Corp. (212-255-4700), is a DOS-based program that can take a sample design and literally turn it inside out—a process known as *quartering*. This technique will assist you in finding and fixing any mismatched sections in your repeat. PrimaVision can also automatically generate *colorways* (an industry term for different color versions of a design) by automatically rotating the colors in the palette.

Creating computer visualizations is an increasingly popular marketing tool that allows you to show clients how your fabric designs will actually look when made into a piece of clothing, an upholstery material, or a room-size carpet. Most textile software handles this process—known as *draping*—using full-color (24-bit), bitmapped images. An important visualization technique found in these CAD programs is the ability to simulate the texture and stitch pattern of woven and knitted fabrics. The Windows-based ModaCAD Design System 32 (310-312-6632), for example, offers an ancillary ModaWeave II module that creates the look of a twill or a Jacquard. ModaCAD also supports 3-D wireframe models and full-scale rendering.

Because many textile artists use their computers as design and marketing tools and not as production tools, not all textile design programs offer color separation functions. Two notable exceptions are Epicad's MagnaDesign system (514-634-3441) and InfoDesign's Vision (212-921-2727). Both of these programs can interface directly with Scitex film plotters or Stork STK laser engravers, producing color separations or printing plates, respectively.

Textile CAD systems typically address one, two, or all three of the following tasks: pattern creation, presentation and marketing materials, and color separations.

Unlike mass-market software, which carries a standard list price, the cost of vertical-market software varies with each custom installation. For example, ModaCAD Design System 32/Windows starts at $12,500, and it becomes more expensive as you add other modules, such as the ModaWeave II enhancement. Likewise, the price of CadTex's PrimaVision changes dramatically, depending on whether you purchase the software alone ($25,000) or opt for a turnkey system, which can run as high as $50,000. Epicad's high-end MagnaDesign starts at $120,000, but if you can live without the electronic-engraving functions you can purchase Epicad's lower-cost Designer 100 for a starting price of $60,000. And the minimum configuration of the Vision turnkey system, from InfoDesign, is priced at $40,000.

Remember that turnkey systems include hardware, such as a system unit, a large-screen monitor, and high-capacity storage devices. They also commonly offer a choice of various color scanners and color printers. Before balking at these admittedly high prices, you should check out the cost of assembling the hardware components on your own. When you factor in the convenience of preassembled hardware and preinstalled software or the cost of training and support, you may find that these prices are not exorbitant. Indeed, your final purchasing decision may be based on issues of support and training rather than price alone. CadTex's PrimaVision package, for example, includes several days of free training. Alternatively, you may find InfoDesign's Vision system appealing because its far-flung dealer network (which includes representatives in Brazil, Argentina, and Columbia) can provide local, Spanish-speaking tech support.

If all of these products are beyond your budget, however, your only option is to use off-the-shelf software. A quick, informal survey of textile designers suggests that there is some real momentum behind Adobe PhotoShop. Its list price of only $895 makes it a downright bargain. Be warned, however, that although it is possible to create textile designs in PhotoShop, it isn't as easy or as automated as with the vertical-market programs. For example, instead of automatically cycling through the colors in a palette in order to generate color variations in a design, PhotoShop requires you either to edit the palette for each change manually or to create and store a series of Alpha-channel masks, one for each color. Similarly, although PhotoShop has a Pattern command that can automatically fill a selection with a repeated design, it does not offer such important, specialized, textile-design options as true quartering and half-step offsets.

—Luisa Simone

Lean, Mean, "Green" Machines From Amdek!

"Lean" on price, **"Mean"** on full features, and **"Green"** on helping to protect you and the environment! The Amdek AM/815E ($379) and the AM/817E ($839) monitors meet the Swedish MPR-II low radiation emission guidelines and the VESA DPMS Energy Star power savings standard. These two monitors will power down when not in use to help save you and the world money on energy. Amdek introduced the industry's first PC video monitor in 1978 and has been successfully providing quality PC monitor solutions for over fourteen years. Amdek "Direct" offers great prices, a 30-day money back guarantee, toll-free technical support, a one year warranty, no surcharge on credit card orders, low pricing on evaluation units, and special programs for resellers and corporate accounts. **Amdek "Direct"**—The best combination of great prices, proven support and immediate availability from a company with over fourteen years of display experience!

Amdek Family of Display Products

	AM/432E	AM/732E	AM/732NI	AM/815E	AM/817E
Screen Size	14"FS VGA Mono	14" SVGA Color	14" SVGA Color	15"FS SVGA Color	17"FS Hi-Res Color
Max Resolution	640x480	1024x768	1024x768NI	1280x1024NI	1600x1200NI
Max Refresh Rate	70 Hz	70 Hz	90 Hz	90 Hz	105 Hz
Dot Pitch	N/A	.28mm	.28mm	.28mm	.26mm
110-240 VAC (Auto-sensing)	Yes	Yes	Yes	Yes	Yes
MPR II Complaint	No	No	Yes (as option)	Yes	Yes
Power Management	No	No	No	Yes	Yes (Avail. 3/94)
PIN Cushion Control	No	No	No	Yes	Yes
*Unit 1 Price	$109	$269	$279	$379	$839
*Unit 2-9 Price	$106	$263	$272	$369	$818
*Evaluation Unit Price	$94	$239	$259	$349	$759

To Order Call Toll Free:
800-72-AMDEK
Call For Volume Discounts

AMDEK
VALUE THROUGH THE YEARS

*Amdek "Direct" pricing. We accept Visa, Mastercard, or cashier's check. Trade accounts are available with credit limits and terms. Shipping, handling, and applicable sales tax not included in the price. All prices, offers and specifications are subject to change without notice. Any return being shipped to an Amdek location will require an RMA (Return Merchandise Authorization) number. Original packaging and proof of purchase required to return any merchandise. Amdek is a registered trademark of Wyse Technology Inc. All other trademarks are the property of their respective owners and are used for identification purposes only. ©1993 Wyse Technology Inc.

CIRCLE 165 ON READER SERVICE CARD

Mail Order Made Easy!
By... **USA FLEX** **...Your "Best Buy"**

Complete FLEX Multimedia Bundle

ONLY $2995

FEATURING...

- 15" FlexVision .28 Non Interlaced Monitor
- FLEX VL486DX2-66MHZ with 340MB Hard Drive, 8MB Ram (intel inside)
- SONY/Sound Blaster Bundle
  - Sony Double-Spin Int. CD ROM Drive
  - Sound Blaster 16 Audio Board, 16-bit Stereo Sound, 2 Speakers, Cables
- BOCA 24/96 Data/Fax Modem
- 3 1/2" Floppy Drive
- HP DeskJet 550C Printer
  - 300 DPI COLOR!
  - 16.7 million colors
- Accessory Kit
  - 6' Printer Cable
  - Disk Storage Box
  - 6 Outlet Surge Protector
  - 11 Piece Tool Kit
  - Mouse Pad
  - Copy Clip
- Software
  - MS DOS 6.2,
  - MS Windows™ 3.1
  - PFS: WindowWorks™

A selection of up to 6 CD-ROM titles. Complete assortment of information, games, facts. Ask your Sales Representative for available titles.

Microsoft Mouse

3.5" Diskettes (Box of 10)

Flex VLB STARTER Bundle

ONLY $1599

FLEX 486SX 25MHz VLB System
- 486SX 25 MHz fully upgradeable
- 4 MB RAM Maximum 64 MB
- 250 MB Hard Drive
- 3.5" 1.44 MB Floppy Drive
- 32-bit VL-Bus Video Accelerator w/ 1MB Display Memory,
- Up to 16.7 Mil. Color, 1280x1024 Max. Res.
- 14" SVGA Color Monitor
- 101 Key Enhanced Keyboard
- Genuine Microsoft Mouse

BOCA 24/96 Data Fax Modem
- 2400 bps data send/ receive
- 9600 bps fax send/ 4800 bps fax receive

HP DeskJet 500 Printer
- 300 DPI Output
- Plain Paper Convenience
- 3 Pages per Minute
- 13 Scalable Fonts
- Prints Envelopes & Transparencies
- 3-Year Warranty

Software to get you Started
- MS-DOS 6.2
- MS Windows ™ 3.1
- PFS: WindowWorks™

FREE Accessories
- 3.5" Diskette (Box of 10)
- Multi-function Disk Storage Box
- 6 Outlet - Surge Protector
- 6 Foot Printer Cable
- 11 Piece Tool Kit
- Mouse Pad • Copy Clip

FLEX VL486 Systems Include

3 VESA Local Bus 32-bit slots • 4 MB RAM (upgradeable to 32MB) 128K Cache • 3-1/2" FD • VESA Local Bus Video Accelerator Board with 1MB video RAM • SVGA Color Monitor (.28mm dot pitch, Non-Interlaced) • Microsoft Mouse • MS-DOS 6.2 • Windows 3.1

Flex VL486SX-25
Intel™ 486SX 25MHz
4MB RAM • 250MB HD
NEW Larger Hard Drive! $1299

Flex VL486DX2-50
Intel™ 486DX2 50MHz
4MB RAM • 340MB HD
NEW Lower Price $1649

Flex VL486DX-33
Intel™ 486DX 33MHz
4MB RAM • 250MB HD
NEW Larger Hard Drive! $1499

Flex VL486DX2-66
Intel™ 486DX 33MHz
4MB RAM • 420MB HD
NEW Larger HD & Lower Price $1849

All FLEX Systems Come With :

NEW
3 Year Warranty with FLEX Express Parts Replacement
Lifetime Factory Labor Warranty
30 day "No-Risk" Money Back Guarantee
Unlimited Toll-Free Technical Support
On-Site Service Option Available

* 3 year limited warranty applies to: case, motherboard, CPU, power supply, hard drive, floppy drives, video card, RAM, keyboard, mouse and any other internal component factory installed at the time of purchase. Monitor and other external peripherals covered by standard manufacturers warranties.

Performer Systems NOW Include 24/96 Internal Data/Fax Modem!

FLEX Performer Systems Include

3 VESA LB 32-bit slots
3-1/2 Inch FD
VESA LB Video Board
SVGA Color Monitor (.39mm Interlaced),
Microsoft Mouse
MS-DOS 6.2

Flex 486S 33
Cyrix Cx486S 33MHz
2 MB RAM • 130MB HD
NEW Larger Hard Drive! $999

Flex 486DX2-50
Cyrix Cx486DX2 50MHz
4 MB RAM • 250MB HD
NEW Larger Hard Drive! $1399

Mail Order Made Easy! By...

USA FLEX

Code # PM03A4 — 471 Brighton Drive, Bloomingdale, IL 60108

TO ORDER, CALL... **1-800-333-4515**

Federal Express® Delivery Service Available — No Surcharge On These Credit Cards

for Systems!

COMPAQ

SPECIAL PURCHASE
Factory-Reconditioned CONTURAs with 1 Year Factory Carry-in Warranty.

NEW LOWER PRICES!

CONTURA 386SL/20
84 /w+ $949
CONTURA 386SL/25
120 /w+ $1099
CONTURA 4/25
120 /w $1549
CONTURA 4/25C
120 /w+/f/m $2299
Other Models Available.
Limited Availability.

151 FS Clr Monitor $409
(Low Emissions) $539

Contura 4/25
120/240*/w ..... $1879 209/418*/w $2149
Contura 4/25c
120/240*/w ..... $2599 209/418*/w $2879
LTE Lite 4/25
120/240*/w ..... $2039 209/418*/w $2319
LTE Lite 4/25E
120/240*/w ..... $2759 209/418*/w $3049
LTE Lite 4/33C
120/240*/w ..... CALL 209/418*/w ..... CALL
PROLINEA 4/25s
120/240*/w+ ..... $999 240/480*/w+ $1089
PROLINEA 4/33s
120 /w ..... $1079 240 /w $1219
340 /w $1299
PROLINEA 4/50
120/240*/w ..... $1479 120/240*/w+ ... $1569
240/480*/w ..... $1629 240/480*/w+ ... $1699
340/680*/w ..... $1699 340/680*/w+ ... $1799
PROLINEA 4/66
120/480* /w ..... $1679 240/480* /w $1869
240/480* /w+ ..... $1829 340/680* /w $1929
340/680* /w+ $1929
DESKPRO 4/25is
240/480*/n ..... $1699 240/480*/n $1749
DESKPRO 4/33is ..... 340/680*/w $1999
DESKPRO 4/33i ..... 240/480*/w $2029
DESKPRO 4/66i 240/480*/n $2389
DESKPRO 486/33M
(w/o HD) ..... $1879 340 ..... $2789
DESKPRO 50M
120MB ..... $2499 340MB $3169

*Capacity of HD with/with-out DOS Double Space. Models /n = includes Ethernet 16TP Controller.

TEXAS INSTRUMENTS

COLOR! As Low As... **$2099**
MONOCHROME As Low As... **$1849**

Limited 1 year warranty.

TravelMate™ 486 Monochrome Notebooks, 10" VGA display, 64 gray scales, 4MB RAM (max. 20MB), 1MB video RAM, 1.44MB FD,DOS 6, Win 3.1, NiCad battery (up to 3-5 hours life), 8.5"x11"x1.8", 5.6 lbs.
TravelMate 4000E WinSX/25 486SX 25MHz, 120MB HD, TravelPoint™ pointing device $1849
TravelMate 4000 WinDX/25 486DX 25MHz, TravelPoint pointing device, 120MB/ 200MB HD ..... $1999/$2179
TravelMate WinDX2/50 486DX2 50MHz, MS BallPoint® w/QuickPort™ pointing device
4000 WinDX2/50 120MB HD $2529
4000E WinDX2/50 200MB HD $2699
TravelMate™ 486 Color Notebooks
256 colors, 512KB Video RAM (1MB on DX2/50), 1.44MB 3.5" FD, DOS 6.0, Win 3.1, MS BallPoint w/QuickPort pointing device, NiCad battery (up to 3-5 hours life).
TravelMate 4000E WinSX/25 Advanced Passive Color 486SX 25MHz, 120MB HD, 4MB RAM, 8.5" color display, Hi-speed video, 6 lbs. $2099
TravelMate 4000 WinDX2/40 Color 486DX2 40MHz, 200MB HD, 9.5" color display, 8MB RAM (exp. to 20MB), 6.3 lbs. $2959
TravelMate 4000E WinDX2/50 Dual Scan Color 486DX2 50MHz, 200MB HD, 4MB RAM (exp. to 20MB),9.4" color display, 6.2 lbs. $3219
TravelMate 4000E WinDX2/50 Active Matrix Color 486DX2 50MHz, 200MB HD, 4MB RAM, 8.5" color display, Hi-speed video, 6.2 lbs. $3799

EPSON

ActionNote™ 4SLC/33MHz & ActionNote™ 4000

From **$1399**

ActionNote 4SLC/33MHz
120MB HD, 4MB RAM *A443291* $1539
170MB HD, 4MB RAM *A443261* $1629
180MB HD, 8MB RAM *A443231* $1999

ActionNote 4000
80MB HD, 4MB RAM *A433211* $1399
120MB HD, 4MB RAM *A433221* $1449

TOSHIBA

NEW

Introducing 2 New Models- The T3400 Portege and The T4700

T3400 Portege

The new standard in ultimate portability!

T4700

The ultimate combination of sight, sound, and processing power in a high-performance notebook computer!

All Toshiba Notebooks come with a 3.5" 1.44MB Diskette Drive, at least one PCMCIA Slot, MS-DOS 6.0 and Windows 3.1

T1950/T1950CT/T1950CS Same as T1900 with 486DX2 40MHz
T1950 9.5" mono., 11.7"x2"x8.4", 6.5 lbs.
120MB *PA1151U-M2A* / 200MB *PA1152U-M2A* ..... $1879/$2089
T1950CS 9.5" Color -Passive, 11.7"x2.1"x8.4", 6.95 lbs.
120MB *PA1151U-S2A*/ 200 MB *PA1152U-S2A* ..... $2479/$2689
T1950CT 8.4" Color -Active, 11.7"x2.1"x8.4", 6.95 lbs.
120MB *PA1151U-T2A* / 200 MB *PA1152U-T2A* ..... $2849/$3129
320MB *PA1153U-T2A* $3489

T3400/T3400CT PORTEGE 8.4" screen, i486SX 33MHz, 4MB (exp to 20 MB), 8K cache, 120MB HD, Built-in AccuPoint, External Diskette Drive, Type II PCMCIA 2.0 slot, COMMWORKS for Win, 3 year warranty. NEW
T3400 Mono., 64 gray scale, 640x480, 9.9"x7.9"x1.8", 4.1lbs.
PA1116U-M9A $2229
T3400CT Color Active Matrix, 256 SVGA Colors at 640x480, 9.9"x7.9"x1.8", 4.4lbs. *PA1116U-T9A* $3449

T4600/T4600C 9.5" screen, i486SL 33MHz, 4MB (exp to 20 MB), 8Kcache, 2 PCMCIA 2.0 slots: (Type II, 1-16mm Type 'IV'), UltraFont, 11.7"x8.3"x1.8", 3 year warranty.
T4600 Mono., NiCad battery, 6.4lbs.
120MB *PA1201U-M2A* / 200MB *PA1202U-M2A* $2299/ $2499
T4600C Color, NiMH battery, 6.7lbs.
120MB *PA1201U-X2A* / 200MB *PA1202U-X2A* ..... $3899/$4149
340MB *PA1203U-X2A* $4449

T4700CT/T4700CS 9.5" screen, i486DX2 50MHz, 3.3V, 8MB (exp to 24 MB), 8K cache, 200MB HD, 2 PCMCIA 2.0 slots: (1-5mm Type II, 1-16mm Type I, II, III), MS Sound System, Indeo™ 3.0 & UltraFont, 11.7"x8.3"x2.0". 3 year warranty. NEW
T4700CT Color Active Matrix, 256 colors at 640x480, 6.9lbs.
200MB *PA1158U-T2A*/320MB *PA1159U-T2A* ..... $3899/$4239
T4700STN Color Dual-scan Passive LCD , 256 SVGA colors at 640x480, 6.9lbs. 200MB *PA1156U-S2A*/320MB *PA1157U-S2A* ..$4579/$4929

T6600C, T6600C/CD, T6600C/CDV Color-Active 10.4" screen, i486DX2 66MHz, 8K cache, 8MB (exp to 40 MB), 510 Hard Drive, 2 full-length 16-bit ISA slots. 16mm PCMCIA 2.01 compliant slot (supports Type I, II, and III cards), 5.25" half-height drive bay, UltraFont™, 15.4"x12.6"x4.7", AC power only, 3 year limited warranty.
T6600C 17.1lbs. *PA1609U-X7A* $6199
T6600C/CD Includes Internal CD-ROM drive (330KB/sec, 230ms access), 18.7lbs. *PA1609U-X8A* $6699
T6600C/CDV Includes Internal CD-ROM drive (330KB/sec, 230ms access), MediaShare®, Mambo™, and DVI®/Ethernet™ board. 19.3lbs.
PA1609U-X5A $7689

ORDER INFORMATION Minimum order $80 Minimum shipping and handling per order $11.95 MasterCard Visa and Discover accepted for USA, Canada APO FPO and Puerto Rico FLEXCARD accepted for continental USA only A $10 surcharge on credit card orders for APO FPO and Puerto Rico C.O.D. order under $500.00 add $5.00 over $500.00 add $10.00 check warranty charge Call for special UPS Red/Blue C.O.D. rates APO/FPO add 5% to cover additional shipping and handling Call for PAL rates CORPORATE/GOVERNMENT ORDERS Corporations rated 1A1 or better and governments accepted on Net 30 terms with receipt of a valid purchase order Leasing Plans available Qualified businesses only RETURN PRODUCT INFORMATION All returns must have prior authorization from our Customer Service Department (1-800-955-1488 or 1-706-351-7172 Mon. - Fri. 7:30 a.m. to 6 p.m. & Sat. 9 a.m. to 5 p.m. CT) All returns must be in as-shipped condition with original packaging including all warranty cards and manuals Product Returns may be subject to a restocking charge We will only accept returns on unopened and non-downloaded software Software compatibility guaranteed only if we have downloaded it on your new FLEX system Thirty (30) day money back guarantee applies to FLEX system only (does not include printers or other non-installed peripherals We will not accept returns on laser printers if toner cartridge has been installed All prices and specifications subject to change without notice Not responsible for typographical or printing errors All trademarks and registered trademarks are of their respective holders ©1994USA FLEX

(706) 582-6206 • FAX (706) 351-7204
Gvn't 1-800-723-2260/Ed. 1-800-944-5588
Gvn't/Ed. FAX (706) 351-9871
Habla Espanol 1-800-723-5500 • (706) 582-6142
Pour les Francophones 1-800-723-2256 • (706) 582-6179
Verhandlungen in deutsch (708) 924-6680
(7:00 Uhr bis 15:00 Uhr)(Midnight to 9:00 a.m. CT)
Customer Service 1-800-955-1488
(7:30 a.m. - 6:00 p.m. Mon.-Fri., Sat. 9 a.m. - 2 p.m. CT)

USA FLEX
1-800-333-4515
Open 24 Hours
Monday - Friday
6 A.M. - 4 P.M.
Saturday & Sunday
Code # PM03A4

CIRCLE 065 ON READER SERVICE CARD

Mail Order Made Easy!
By... USA FLEX

IBM & HP

The Value Package

IBM ValuePoint 486DX 33MHz System!

HP DeskJet 500 Printer

Only $1999

HEWLETT® PACKARD
Authorized Dealer

IBM® PS/ValuePoint™ System

- IBM Model 6381M50
- Genuine Intel® **486DX 33MHz**
- 4MB RAM (64 MB maximum)
- 212 MB Hard Drive
- VESA Local Bus SVGA video with 512K Video Memory
- 3.5", 1.44MB diskette drive
- 15" FlexVision SVGA .28 NI color monitor
- 2 serial, 1 parallel, keyboard & mouse ports
- Basic 101-key keyboard
- Mouse
- 1 Year Onsite Warranty
- Around-the-clock IBM HelpWare®

HP DeskJet 500 Printer

- Laser-quality 300 dpi output
- Prints 3 pages per minute
- Water resistant ink
- Plain-paper convenience
- Print envelopes and transparencies
- Feeds up to 100 sheets (letter or legal)
- Perfect for Windows users
- 3-Year Warranty -the longest in the industry

Plus, Software and Accessories

- IBM DOS 6.1
- MS Windows ™ 3.1
- PFS: WindowWorks™
  - Word Processing
  - Data Base
  - Spreadsheet
- 3.5" Diskettes (Box of 10)
- 6 Foot Printer Cable
- Disk Storage Box
- 6 Outlet Surge Protector
- 11 Piece Tool Kit
- Mouse Pad

SPECIAL

UPGRADE! FOR ONLY $399
HP DeskJet 550C Printer
COLOR
and 15" Flat Square SVGA .28 NI Monitor

HP Makes them Great. USA Flex Makes them Affordable.

HP Support Pack–3 years of Express Exchange Support
DeskJet 310, 500 *HJ5461A* $49
DeskJet 500C, 550C *HJ5462A* $59
OtherDeskJet accessories available, including cables, memory & cartridges!

HP DeskJet 500 Printer

- Delivers high-quality Laser-like 300 dpi output
- Plain-paper convenience saves you money
- Print envelopes and transparencies
- Fast print speed-up to 3 pages per minute
- Improved water-resistant ink
- Feeds up to 100 sheets (letter or legal)
- Print up to 16.7 million levels of gray
- Includes 13 scalable typefaces for Windows
- 3-Year Warranty-the longest in the industry

B1-C2106A $289
Black ink cartridge *51626A* $25

HP DeskJet 500C Printer

- Delivers high-quality Laser-like 300 dpi output
- Single inkjet cartridge system
- Simple black or color ink cartridge swapping
- Perfect for full color printing needs
- Prints up to 16.7 million levels of color
- Swap ink cartridge for black-ink printing
- Plain-paper convenience saves you money
- Print envelopes and transparencies
- 3-Year Warranty-the longest in the industry

COLOR PRINTER

B1-C2114A $389
Color ink cartridge *51625A* $29
Black cartridge *51626A* $25

HP DeskJet 550C Printer

- Laser-quality 300 dpi output
- Dual inkjet cartridge system for Simultaneous black and color printing
- Up to 16.7 million colors
- Plain-paper convenience
- Print envelopes and transparencies
- Feeds up to 100 sheets (letter or legal)
- Perfect for windows users
- 3-Year Warranty

BLACK and COLOR PRINTER

C2121A $489
Color ink cartridge *51625A* $29
Black cartridge *51626A* $25

HP DeskJet 310 Printer

- Laser-quality 300 dpi output
- 2 ppm for Letter Quality, 3 ppm for draft
- Over 16 million colors available (depending on software)
- 84 typeface, style & size combinations
- Parallel interface
- PCL Level 3 w/ extensions
- Weights 4.3 lbs. 12" x 2.5" x 7.75"
- 1 year warranty

COLOR Capable Kit Available!

C2621A $299
Color kit *C3067A* $39.95
Automatic cut sheet feeder *C3005A* $69.95

Mail Order Made Easy! By...
USA FLEX
Code # PM0344 471 Brighton Drive, Bloomingdale, IL 60108

TO ORDER, CALL... **1-800-876-5607**

Federal Express® Delivery Service Available
No Surcharge On These Credit Cards

Two Big Names...One Little Price!

Ask for our latest catalog.

The Performance Package

IBM ValuePoint 486DX2 66MHz System!

COLOR HP DeskJet 500C Printer

intel inside

Only $2499

HEWLETT® PACKARD
Authorized Dealer

IBM Business Partner
Authorized Advanced Products Dealer

IBM® PS/ValuePoint™ 486DX2 66

- IBM Model 6381W50
- Genuine Intel® 486DX 33MHz
- 4MB RAM (64 MB maximum)
- 212 MB Hard Drive
- VESA Local Bus SVGA video with 512K Video Memory
- 3.5", 1.44MB diskette drive
- 15" SVGA .28 NI color monitor
- 2 serial, 1 parallel, keyboard & mouse ports
- Basic 101-key keyboard
- Mouse
- 1 Year Onsite Warranty
- Around-the-clock IBM HelpWare®

COLOR HP DeskJet 500C Printer

- Laser-quality 300 dpi output
- Up to 16.7 million levels of color
- Water resistant ink
- Print envelopes and transparencies
- Plain-paper convenience
- Feeds up to 100 sheets (letter or legal)
- Perfect for Windows users
- 3-Year Warranty -the longest in the industry

Plus, Software and Accessories

- IBM DOS 6.1
- MS Windows ™ 3.1
- PFS: WindowWorks™
  - Word Processing
  - Data Base
  - Spreadsheet
- 3.5" Diskettes (Box of 10)
- 6 Foot Printer Cable
- Disk Storage Box
- 6 Outlet Surge Protector
- 11 Piece Tool Kit
- Mouse Pad

Maximize Your Investment IBM HelpWare® *With 1 Year Onsite Warranty and Toll-Free 24-Hour Technical Support from IBM!*

Power & Performance at an affordable price!

IBM® PS/ValuePoint™

$1249*

*System prices include 14" FLEXVISION SVGA .28mm dot pitch, 1024x768 NI Monitor. Other ValuePoint models (including Mini-Tower) are available. Ask your Flex Sales Representative for details and prices.

IBM PS/ValuePoint Specifications

Model	Clock Speed	Hard Drive/ Ave. Access	ISA Slots	3.5"/5.25" Bays	Video RAM	DOS Version	Flex Part #	Flex Price* without monitor	Flex Price* with monitor
PS/ValuePoint Si - SpaceSaver									
486SX	25 MHz	120 MB/15 ms	3	2/1	512K	6.1	*6381F30*	Call	$1249
486SX	25 MHz	212 MB/13 ms	3	2/1	512K	6.1	*6381F50*	Call	$1349
486DX	33 MHz	120 MB/15 ms	3	2/1	512K	6.1	*6381M30*	Call	$1579
486DX	33 MHz	212 MB/13 ms	3	2/1	512K	6.1	*6381M50*	Call	$1699
486DX2	66 MHz	212 MB/13 ms	3	2/1	512K	6.1	*6381W50*	Call	$2079
PS/ValuePoint Desktop (Includes 32-Bit VLB Slot, ZIFF socket, and is Pentium™ Overdrive Upgradeable)									
486SX	33 MHz	170 MB/14 ms	5	3/2	1 MB	6.1	*6384L40*	Call	$1599
486DX	33 MHz	212 MB/13 ms	5	3/2	1 MB	6.1	*6384N50*	Call	$1799
486DX	33 MHz	340 MB/14 ms	5	3/2	1 MB	6.1	*6384N70*	Call	$1999
486DX2	66 MHz	340 MB/14 ms	5	3/2	1 MB	6.1	*6384X70*	Call	$2399

All PS/ValuePoint Systems Feature

- Genuine Intel Microprocessors
- 4MB RAM (Upgradeable to 64 MB)
- VESA Local Bus SVGA video
- One 3.5", 1.44MB diskette drive
- 2 serial, 1 parallel, keyboard, mouse
- Basic 101-key keyboard
- IBM DOS and MS Windows 3.1
- 1 Year Onsite Warranty
- Around-the-clock IBM HelpWare Support

IBM Business Partner
Authorized Advanced Products Dealer

IBM, HelpCenter and HelpWare are registered trademarks and PS/ValuePoint, HelpBuy, and HelpLearn are trademarks of International Business Machines Corporation. Pentium is a trademark, and Intel and the Intel Inside logo are registered trademarks of Intel Corporation.

ORDER INFORMATION: Minimum order $80. Minimum shipping and handling per order $10.95. MasterCard, Visa and Discover accepted for USA. Canada APO, FPO and Puerto Rico. FLEXCARD accepted for orders in the USA only. A $5.00 surcharge for credit card orders for APO, FPO and Puerto Rico. C.O.D. order under $500 ok, add $5.00; over $500 ok, add $10.00; check warranty charge. Call for special UPS Red/Blue C.O.D. rates. APO, FPO add $5.00; over additional shipping and handling. Call for PAL rates. CORPORATE GOVERNMENT ORDERS: Corporations rated 1A1 or better and government agencies accepted on Net 30 terms with receipt of a valid purchase order. Leasing Plans available for qualified businesses only. REFURBISHED INFORMATION: All returns must have prior authorization from our Customer Service Department at 1-800-955-1488 or 1-708-351-7200. Monday - Friday 8 a.m. to 6 p.m. & Saturday 9 a.m. to 2 p.m. CT. All returns must be in as shipped condition, with original packaging, including all warranty cards and manuals. Product Returns may be subject to a restocking charge. We will only accept returns on unopened and non-downloaded software. Software compatibility guaranteed only if we have downloaded it on your new FLEX system. Thirty (30) day money back guarantee applies to FLEX system only; does not include printers or other non-installed peripherals. We will not accept returns on laser printers if toner cartridge has been installed. All prices and specifications subject to change without notice. Not responsible for typographical or printing errors. All trademarks and registered trademarks are of their respective holders. ©1994USA FLEX.

(708) 582-6206 • FAX (708) 351-7204
Gvn't 1-800-723-2260/Ed. 1-800-944-5588
Gvn't/Ed. FAX (708) 351-9871
Habla Español 1-800-723-5500 • (708) 582-6142
Pour les Francophones 1-800-723-2256 • (708) 582-6179
Verhandlungen in deutsch (708) 924-6680
(7:00 Uhr bis 15:00 Uhr)(Midnight to 9:00 a.m. CT)
Customer Service 1-800-955-1488
(7:30 a.m. - 8:00 p.m. Mon.-Fri., Sat. 9 a.m. - 2 p.m. CT)

USA ★ FLEX
1-800-876-5607
Open 24 Hours
Sunday - Friday
9 A.M. - 4 P.M.
Saturday & Sunday
Code # PM03A4

CIRCLE 210 ON READER SERVICE CARD

Mail Order Made Easy! By... USA FLEX ...The Best Names

PRINTERS

IBM® PRINTERS BY LEXMARK™

LaserPrinter 4039 10R	$1349
LaserPrinter 4039 12R	$1699
LaserPrinter 4039 10D	$1849
LaserPrinter 4039 12L	$2449
LaserPrinter 4039 16L	$2749
LaserPrinter 4037 5E	$659
Ink Jet 4076 ExecJet II	$279
PS4079 Color	$2499
2380 Plus/2381 Plus	$309/$439
2390 Plus/2391 Plus	$329/$439

EPSON LASER PRINTERS EPSON

ACTION LASER 1000	$599
ACTION LASER 1500	$649
ACTION LASER 1500-II	$719

EPSON DOT MATRIX PRINTERS

LX-810	$164	LQ-870	$439
AP 3250	$172	LQ-1170	$598
AP 3260	$198	LQ-2550 Clr.	$899
LQ-570+	$239	DFX-5000	$1319
FX-870	$268	DFX-8000	$2249
FX-1170	$349	Stylus 300	$229
LQ-1070+	$364	Stylus 800	$279

Panasonic Office Automation

LASER PRINTERS

KX-P4400	$549	KX-P4440	$999
KX-P4410	$529	KX-P5400	$799
KX-P4430	$659		

DOT MATRIX PRINTERS

KX-P1150	$129	KX-P1624	$369
KX-P2023	$199	KX-P1695	$389
KX-P2123	$239	KX-P2624	$389
KX-P2124	$309	KX-P1654	$579
KX-P2180	$179		

NEC

PRINTERS

Silentwriter Model 610	$569
Silentwriter 95/fx	$869/$1099
Silentwriter Model 1097	$1379

TEXAS INSTRUMENTS

microLaser™ Pro 600 PS23	$1309*
microLaser™ Pro 600 PS65	$1529
microLaser Imaging Cartridge	$159
microWriter Page Printer	$519
microWriter PS23 PS Printer	$679
microWriter PS65 PS Printer	$939
microWriter Toner Kit	$45
microMarc™ Inkjet	$249**
microMarc Print Cartridge	$39

*After $60 mail-in rebate
**After $30 mail-in rebate. Ends 3-31-94.

Canon

BUBBLE JET PRINTERS

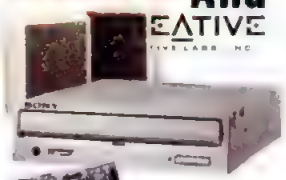
BJ-10SX Portable	$259
BJ-200e Narrow Carriage	$289
BJ-230 Wide Carriage	$389
BJC-600 Color	$589
BJC-800 Color	$1499
BJC-820 Color	$1629

LASER BEAM PRINTERS

LBP-430	$589

Unbelievable Offer! SONY SOUND BLASTER BUNDLE

SONY And CREATIVE



$299

SONYBLASTER (B)

Sony CDU-33A Double-Speed Internal Drive 300KB/sec transfer, 350ms access, 64KB buffer

Sound Blaster 16 Audio Board by Creative Labs 8-/16-bit stereo sampling & playback, 20-voice, 4-operator FM synthesizer,stereo digital mixer, power amplifier & expansion connector.

Speakers, cables & instructions

CD-ROM Bundles, Drives, Sound Cards, Video Boards and Speakers

CD-ROM Bundles

Creative Labs
- Omni CD™ (Int.) *D1-131009* $289
- Discovery CD 8 (Int.) *D1-DSCI-8* $349
- Discovery CD 16 (Int.) *D1-DSCI-16* $419
- Edutainment™ 16 (Int.) *D1-EDTI-16* $479
- Digitaledge CD™ (Int.) *D1-DIGI* $629

MediaVision
- Double Fusion LX $425
- Fusion Double CD 16 Int. $535
- Pro 16 Multimedia Int. System II $615

Drives

Mitsumi
- FX001 $169
- FX011D $219

Sony
- CDU-33A-KIT with Internal Drive $199

MicroSolutions
- Plug 'N' Play Double Spin Portable *D1-BP/CDROM* $379

Toshiba
- Internal *XM3401B-TA* $399
- External *3401P1000* $599

NEC 3x MultiSpin Family
- 3Xi Internal *D1-CDR-3XI* $469
- 3Xe External *D1-CDR-3XE* $559
- 3Xp Personal White *D1-CDR-3XPW* or Gray *D1-CDR-3XPG* $429

Sound Cards and Video Boards

MediaVision
- ProAudio Spectrum 16 $135
- ProAudio Studio 16 $165

Aztech
- Sound Galaxy NX Pro Extra $99
- Sound Galaxy NX II $69
- Sound Galaxy Basic 16 $115
- Sound Galaxy NX Pro 16 Extra $135

Creative Labs
- Sound Blaster Pro Deluxe $109
- Sound Blaster 16 Basic $129
- Sound Blaster 16 SCSI-2™ $179
- Sound Blaster 16 SCSI-2 Advanced Signal Processing $209
- Sound Blaster 16 MultiCD™ $159
- Sound Blaster 16 MultiCD Advanced Signal Processing $169
- WaveBlaster™ $169
- Voice Assist™ $59

New Media Graphics
- Tape It! $345
- Watch It! $239

ADS Video Clipper $315
- PC Prime Time $325
- VGA-TV Elite $229

Speakers

Altec Lansing
- ACS50 $75
- ACS150 $115
- ACS100 $129
- ACS300 $299

MONITORS

NEC

14" SVGA	$309	17" 5FGp	$1229
15" 3V	$509	21" 6FGp	$2369
15" 3FGe	$579		
15" 4FGe	$689	Special Purchase	
17" 5FGe	$1049	6FG-OEM	$1999

FLEXVISION

- 14" VGA MONO $119
- 14" 1024X768 NI $265
- 15" 1280X1024 $429

CTX

- 14" D1-6468GM $279
- 14" D1-1451GM NI $299
- 15" D1-1562GM $399

MAG

- 14" LX1450 LG $319
- 15" MX15F-L $519
- 17" MX17F-L $879

HITACHI SuperScan™

- 15" 15S $489
- 17" Elite 17 $1349
- 20" 20S/Pro20 $1389/$1689
- 21" Pro21/Elite21 $2199/$2499

SONY

- 14" CPD-1430 $549
- 14" CPD-1730 $1079
- 20" GDM-2036S $2069

H-P FAX MACHINES

HEWLETT PACKARD

HP FAX-900 Plain paper fax	$769
HP FAX-950 Plain paper fax	$949

TAPE BACK-UP

COLORADO MEMORY SYSTEMS, INC.

Ask about special on tape caddy

JUMBO 250 Int/Ext.	$169/$249
JUMBO TRAKKER 120MB	$219
JUMBO TRAKKER 250MB	$329
POWERTAPE™	
1100 Int/Ext. (525MB)	$679/CALL
2400 Int/Ext. (1.2MB)	$949/$1089
4000 Int/Ext. (2.0MB)	$1199/$1399
PowerDAT6000	
Int/Ext. (4.0MB)	$1199/$1399

DATA CARTRIDGES

3M

DC2000 40/80MB	$11.95 ea.
DC2120 120/250MB	$15.45 ea.
DC2120 Ximat (QIC-80)	$20.45 ea.
DC2120 Rhomat	$22.45 ea.
DC600A	$16.45 ea.
DC6150 250/500MB	$17.45 ea.
DC6250 250/500MB	$22.45 ea.
DC6525 350/700MB	$27.45 ea.

MODEMS

Hayes

ACCURA 2400 Int./Ext.	$65/$75
ACCURA 96+fax96 Int./Ext.	$189/$209
ACCURA 144+fax144 Int./Ext.	$199/$229
Optima 144+ fax Pocket Ed.	$119

U.S. Robotics

Sportster 9600 Fax® Int./Ext.	$139/$159
Sportster 14.4 Fax® Int. /Ext.	$159/$179
World Port 14.4 Pocket Modem Ext.	$239
Courier V.32 Terbo w/ ASL 19,200 bps Int. /Ext.	$339/$389
Courier V.32 Terbo w/ ASL FAX 19,200/14,400 bps Int. /Ext. /PS/2 Int.	$349/$399/$349

BOCA

14,400/14,400 V.32 Int. /Ext.	$119/$149

VIDEO CARDS

ATI

- GRAPHICS ULTRA+ 2MB $239
- GRAPHICS ULTRATM PRO 2MB ISA/VLB/EISA $359/$359/$399

DIAMOND

- SPEEDSTAR PRO 1MB ISA/VLB $109/$119
- STEALTH PRO VLB (2MB) $339
- VIPER VLB 2MB $389

Dynamite Pro ISA (1MB/2MB) $159/$199
- Dynamite Pro VLB (1MB/2MB) $159/$199
- Graphite Pro ISA (1MB/2MB) $249/$379
- Graphite Pro VLB (1MB/2MB) $249/$379
- 2MB Upgrade Kit $159

ORCHID

- Fahrenheit 1280+ 1MB ISA/VLB $159/$169
- Fahrenheit 1280+ 2MB VLB $209
- Fahrenheit VA 1MB ISA (only) $179
- Celsius VLB 1MB/2MB $239/$299

PARADISE

- Accelerator Value Board For Windows™ 1MB $79
- Accelerator VL Plus Card 1MB $145
- Paradise Accelerator/Ports O' Call 1MB $199

POWER PROTECTION

TRIPPLITE THE POWER PEOPLE

Call for other models

- New Power Miser ($5,000 Protection) $59
- New Super 7 (2 year warranty) $19
- ISOBAR® Surge Suppressors ($10,000 Protection) Isobar 4/Isobar 6/Isobar 8 $46/$51/$59
- ($5,000 Protection) $49
- ISOBAR® Ultra Surge Suppress. ($25,000 Protection) 4/6/8 $49/$59/69
- DataShield S100 Surge Suppressor ($5,000 Protection) $59
- Isotel® Ultra Surge Suppress. ($25,000 Protection) 6/8 $64/$74
- ISOBAR® Command Console Plus ($10,000 Protection) $75

FOR LESS!

SHARP

Color LCD Notebook Computers

- SL-enhanced 33MHz i486™DX Processor with Built-in Power Management
- PCMCIA type II credit-card-size adapter slot
- 200MB Hard Drive
- 1.44MB Floppy Drive
- 4MB RAM (Exp. to 8MB or 20MB)
- MS-DOS® 6.0 & Windows™ 3.1
- Optional External trackball

FREE

Dual-Scan Color LCD *SH-PC8150* $2599

Active-Matrix TFT LCD *SH-PC8650* $2999

SHARP

JX-9400 Laser Printer

NEW

- Ultra compact desktop design with a footprint of only 1.3 sq. feet.
- Quick 6 ppm at 300 dpi
- 512K of memory, exp. to 4.5MB
- Virtually silent with Sharp's "Sleep" mode
- Economical toner/ developer cartridge included for printing of up to 5,000 pages. 15,000 page, long life cartridge available.
- 5 popular printer emulations, including HP PCL 4
- Flexible paper handling with built-in 250-sheet letter cassette and manual feed capability, plus optional legal and envelope cassette

$499

SH-JX9400 .....

JX-9460PS Laser Printer 6 ppm, 600 dpi PhoenixPage™ PostScript, 2MB RAM, one 250 sheet paper tray, parallel I/F. $959

SH-JX9460PS .....

JX-9660PS Laser Printer 8 ppm, 600 dpi PhoenixPage™ PostScript, AppleTalk, 2MB RAM, one 500 sheet paper tray, parallel I/F. Silent "Sleep Mode" Technology $1249

SH-JX9660PS .....

Optional 15,000 page toner cartridge. *JX96ND* $169

March Monitor Madness

NEW

PHILIPS

Brilliance® Low-Emission Autoscan Color Monitors

NEW 15" Brilliance® EVGA - .28mm, 1024 x 768 NI @ 72 Hz, built-in stereo audio input, Max: 58KHz Hor. /100Hz Vert. scan freq. 110/220V. ***Meets MPR II.*** *D1-1520AS* $449

NEW 17" Brilliance - .27mm Microprocessor based, 1280x1024 @ 76 Hz, Max: 82KHz Hor. /120Hz Vert. scan freq. 110/220V. ***Meets MPR II.*** *D1-1720DC* $999

NEW 21" Brilliance - .28mm Microprocessor based, 1600x1280 @ 60 Hz, Max: 82KHz Hor. /160Hz Vert. scan freq. 110/220V. ***Meets MPR II.*** *D1-2120DC* $2299

MAGNAVOX

Smart. Very smart.®

14" Paper White Mono VGA - 640 x 480 @ 60 Hz, Max: 31.5KHz Hor. /70Hz Vert. scan freq. *D1-M749* $125

14" Super VGA - .39mm, 1024 x 768i , Max: 35.5KHz Hor. /100Hz Vert. scan freq. *D1-CM2089* $259

14" Super VGA - .28mm, 1024 x 768 NI , Max: 35.5KHz Hor. /100Hz Vert. scan freq. *D1-CM2099* $265

20" Super VGA - .31mm, 1280 x 1024 , Max: 60KHz Hor. /90Hz Vert. scan freq. *D1-20CM64* $1159

MAG INNOVISION

14" LX1450LG - .28mm, 1024x768 NI @ 60 Hz,Max: 50KHz Hor./100Hz Vert. scan freq. 110/220V. Energy Star. ***Meets MPR II.*** *D1-LX1450LG* $319

15" MX15F-L - Microprocessor based, .28mm, 1280x1024 NI @ 60 Hz, Max: 68KHz Hor./120Hz Vert. scan freq. 110/220V. ***Meets MPR-II.*** *MAG-MX15F-L* $519

17" MX17F-L - Microprocessor based, .26mm, 1280x1024 NI @ 60 Hz, 120MHz bandwidth, Max: 68KHz Hor./120Hz Vert. scan freq. 110/220V. ***Meets MPR II.*** *MAG-MX17F-L* $879

17" MX17LG - Microprocessor based, .26mm, 1280x1024 NI @ 60 Hz, 120MHz bandwidth, Max: 68KHz Hor./120Hz Vert. scan freq. 110/220V. Energy Star . ***Meets MPR II.*** *MAG-MX17LG* $929

SONY

NEW AT USA FLEX!

The Leader in Trinitron Display Technology

14" CPD-1430 - .25mm, 1024x768 NI @72 Hz, Max: 58KHz Hor./110Hz Vert. scan freq. 120/240V. *CPD-1430* $589

17" CPD-1730 - .25mm, 1024x768 NI @72 Hz, Max: 58KHz Hor./110Hz Vert. scan freq. 120/240V. *CPD-1730* $1079

17" CPD-1730 - .25mm, 1600x1200 @60 Hz, Max: 82KHz Hor./150Hz Vert. scan freq. 110/220V. ***Meets MPR II.*** *GDM-17SE1* $1199

20" GDM-2036S - .30mm, 1280 X 1024 NI @ 60 Hz, Max: 71KHz Hor./120Hz Vert. scan freq. 110/220V. ***Meets MPR II.*** *D1-GDM2036S* $2069

20" GDM-2036S - .30mm, 1600 X 1200 @ 60 Hz, Max: 85KHz Hor./160Hz Vert. scan freq. 110/220V. ***Meets MPR II.*** *D1-GDM2038* $2399

ORDER INFORMATION: Minimum order $80. Minimum shipping and handling per order $11.95. MasterCard, Visa and Discover accepted for USA, Canada, APO, FPO and Puerto Rico. FLEXCARD accepted for continental USA only. A $10 surcharge on credit card orders for APO, FPO and Puerto Rico. C.O.D. order under $500 is $6.00, over $500 is $10. Business warranty charge. Call for specific APO, FPO and Puerto Rico C.O.D. rates. APO/FPO add $4% to cover additional shipping and handling. Call for P.O. rates. CORPORATE GOVERNMENT ORDERS: Corporations rated 1A1 or better and government agencies accepted. Net 30 terms with receipt of a valid purchase order. Leasing Plans available for qualified businesses only. RETURN PRODUCT INFORMATION: All returns must have prior authorization from our Customer Service Department. 1-800-955-1488 or (708) 351-7172 Mon. - Fri. 7:30 a.m. to 6 p.m. & Sat. 9 a.m. to 2 p.m. CT. All returns must be mass shipped undamaged, with original packaging, including all warranty cards and manuals. Product Returns may be subject to a restocking charge. We will only accept returns on unopened and non-downloaded software. Software compatibility guaranteed only if we have downloaded it for your new FLEX system. Thirty (30) day money back guarantee applies to FLEX system only. It does not include printers or other non-installed peripherals. We will not accept returns on laser printers if toner cartridge has been installed. All prices and specifications subject to change, without notice. Not responsible for typographical or printing errors. All trademarks and registered trademarks are of their respective holders. ©1994 USA FLEX.

(708) 582-6206 • FAX (708) 351-7204
Gvn't 1-800-723-2260/Ed 1-800-944-5588
Gvn't/Ed. FAX (708) 351-9871
Habla Espanol 1-800-723-5500 • (708) 582-6142
Pour les Francophones 1-800-723-2256 • (708) 582-6179
Verhandlungen in deutsch (708) 924-6680
(7:00 Uhr bis 15:00 Uhr)(Midnight to 9:00 a.m. CT)
Customer Service 1-800-955-1488
(7:30 a.m. - 6:00 p.m. Mon.-Fri., Sat. 9 a.m. - 2 p.m. CT)

USA FLEX
1-800-766-1940
Open 24 Hours
Monday - Friday
9 A.M. - 4 P.M.
Saturday & Sunday
Code # PM03A4

CIRCLE 055 ON READER SERVICE CARD

If you recently purchased one of these...

~~IBM~~ ~~DELL~~ ~~ZEOS~~ ~~COMPAQ~~ ~~GATE WAY 2000~~

DO NOT READ THIS AD

(BECAUSE IF YOU DID...YOU PAID TOO MUCH FOR TOO LITTLE)

Windows Software EXPERTS' PICK

intel inside

TravelPro 5300

Fully Upgradable • Fully Accessible
Fastest Performer of Any Notebook

Choice of Upgradable Intel CPU's 486SX-25, 486DX-33, 486DX2-50 & 486DX2-66 including 3.3v; - Available in upgradable Active Matrix, Dual Scan Passive or Monochrome Displays - Local Bus Video - Fastest Performance of any Notebook for True Desktop Power. - Built-In Center Trackball - PCMCIA Type III - Upgradable CPU, RAM & Display - Over 3 hours of Battery Life - 5.9 lbs. Mono - 6.3 lbs. Color - Removable 120MB Hard Drive (200-540MB Avail.) - Optional Internal Fax/Modem - Optional Docking Station

Prices Starting At

5325 25MHz Active Matrix	**$2995**
5325 25MHz Dual Scan Passive	**$2050**
5325 25MHz Monochrome	**$1525**

Included With Every AMS Notebook

- MS DOS 6.2
- Windows 3.11 Workgroup Ed With Built-In Networking
- AC Adapter
- NiMH Battery
- Executive Carrying Case

TravelPro 7000

Ergonomics & Power Management
The Value Priced Notebook Leader

Featuring Large Center Based 25mm Trackball With Palmrest for ease of use - Choice of Intel Low Voltage SX-25 or SL-25 CPU (SL-25 Operates at DX-33 speed) - Choice of Monochrome or Dual Scan Displays - Includes: PCMCIA Type III (Takes 2 Type II or 1 Type III Device) or Internal 9600/2400 Fax/Modem with Communication Software - Upgradable RAM - Removable Hard Drive (120-540mb) - Unique Removable Keyboard for easy access to Upgrades or International Keyboard Support. - all for hundreds less than comparable systems

Prices Starting At

7525 SL-25 MHz Monochrome	**$1495**
7325 SX-25 MHz Dual Scan Passive	**$1895**
7325 SX-25 MHz Monochrome	**$1375**

Introducing... The SoundPro 486

Call For Details

- Built-In 16bit DSS (Digital Sound System), *For Presentation Quality Sound !*
- Local Bus Hard Drive and Video, *For Incredible System Performance!*
- Upgradable CPU, Hard Drive, RAM & Display, *For Unlimited Expansion!*
- Includes Windows Sound System Software & Performance Portable Speakers

Call now and listen to a demo!

The most advanced computer available ...period.

16 Bit Sound
Local Bus I/O
Local Bus Video
3.3 Volt System

Corporate, Dealer & Government Pricing Available

1 or 2 Year Extension Available

24 Hour BBS (818) 960-9171

Lifetime Tech Support

30 Day Money Back

Building High Performance Notebook Systems Since 1985

AMS

Hours of Operation: M-F 6:30 a.m. - 6:00 p.m. • Saturday 9:00 a.m. - 3:00 p.m. PST

1-800-868-8108

CIRCLE 235 ON READER SERVICE CARD

12881 Ramona Blvd. Irwindale, CA. 91706
Tel: (818) 814-8051 ☎ Fax: (818) 814-0782

Intel Inside is a registered Trademark of Intel Corp. MS Dos & MS Windows are registered trademarks of Microsoft Corp. Not responsible for errors in advertising. Call for details on 30 day money back guarantee, restrictions apply

Editor's Pick The Best Products of 1993

CLARIS CORP.

ClarisWorks™

The new #1 choice for Windows integrated software

ClarisWorks™ for Windows is the new #1 choice for integrated software offering powerful word processing, database, spreadsheet, charting and graphics capabilities. Dramatically different from other 'works' programs, the unique frame-based architecture provides a single application where you can seamlessly combine text, graphics, spreadsheets and charts all within the same page on the same screen. The elegant design offers a level of polish unknown among integrated programs.

ClarisWorks™ provides you with all the essential features you need to quickly produce high quality, professional documents. Its intuitive interface makes learning a breeze. There are outstanding training materials, sample files and a comprehensive on line help to instantly answer your questions.

$129

FRACTAL DESIGN

Painter 2.0™

with new photo design features

Fractal Design Painter, the award winning 24-bit color paint program, simulates the tools and textures of natural-media. Dozens of art tools, like pastel chalks, crayons, felt pens, and paper textures give you amazing power. Painter can be used to create original art or apply natural-media to other artwork, including scanned images.

Painter also includes photo and design features such as: image retouching, color separations, tear-off tools, visual previews, additional natural-media tools like marbling, glass distortion and liquid effects, snap-to and adjustable grid paper, Type 1 and TrueType™ font support, and straight line tools. Perfect for designers, fine artists, graphic artists, and students.

$269

INSET SYSTEMS

HiJaak® PRO

Use Virtually Any Image Anywhere!

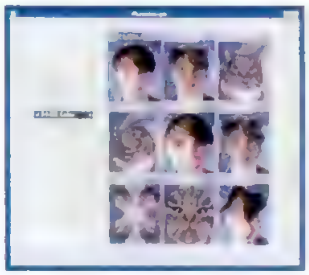
Convert 70+ vector, raster, and fax formats. Capture all or part of any Windows screen. Capture to HiJaak PRO, clipboard, printer, and/or graphics file. Capture DOS screens up to 1024 x 768 at 256 colors

Extensive image processing allows adjustment of tonal range (contrast brightness, gamma, histogram equalization,) color remapping, color reduction (palette optimization, dither, halftone, diffuse) Browse "thumbnails" of your images

Import images directly into major Windows applications - without starting HiJaak PRO! Supports OLE, JPEG, PhotoCD, TWAIN, cross-platform conversions to Macintosh, SUN, Amiga & more!

$87

NORTH COAST SOFTWARE



PhotoMorph

Catch the new wave of desktop video with *PhotoMorph!*

With PhotoMorph you can create the same amazing special effects that you've seen in Hollywood movies! PhotoMorph provides professional strength morphing and warping as well as 30 other video effects.

PhotoMorph can be used to create high resolution still images for graphic design and layout. It can also create motion videos for playback on a PC or output to video tape.

Easy to use, fun & affordable!

$89

HEWLETT PACKARD

Dashboard 2.0™

The convenient, push-button utility panel for Windows!

If you have a need for speed and a craving for fingertip control, Dashboard is the convenient push-button utility panel to reach for. Launch applications at the touch of a key. Zip between them with ease. Switch between entirely different extended screen setups instantly. Or monitor your memory and resources with a quick check of the fuel gauge . . . never has so much mobility and convenience been packed into so little screen and disk space. It's all the push-button control and one-click convenience you want, and all the speed you need.

The fastest way to work in Windows!

$49

BOOKMAKER CORP.

ClickBook 1.01

"A great utility that's stunningly easy to use!"

ClickBook™ is a printing utility that automatically prints various size booklets from any Windows 3.1 application. After installing itself into the print setup dialog box, ClickBook automatically rotates, scales and paginates individual pages into double-sided, multi-page booklets.

ClickBook™ even shows users how to reinsert paper into any Windows supported printer for double-sided printing. ClickBook has been tested with hundreds of leading Windows products including Word, Excel, Ami Pro, WordPerfect, Paradox, Access and PowerPoint.

$55

The Only Source

First SOURCE International

ORDER NOW!

First Source International, Inc.

▶ (800) 303-9866 ◀

7 Journey • Aliso Viejo, CA 92656 • (714) 448-7750 • FAX (714) 448-7760

MEMORY · MEMORY

FOR CURRENT PRICING CALL NOW!

SIMM MODULES

1 x 9 (3-chip)	$43
4 x 9	$154
1 x 36	$181
2 x 36	$354

Apple Type		IBM Type	
1MB x 8-70	$43	1 x 9-70ns (9 chip)	$46
4MB x 8 70	$145	1 x 9 80ns Static Col.	$52
1 x 32 70ns	$149	512K x 36 (2MB)	$76
2 x 32 70ns	$287	4MB x 36 (16MB)	$640

LAPTOP & NOTEBOOK MEMORY

Apple

PowerBook 140, 145, 170, 160, 180	4MB		$169
	6MB		$263
PowerBook 165c, 180c	4MB		$195
	10MB		$395
PowerBook Duo 210, 230	4MB		$167
	8MB		$299

AST

NEW PowerExec 4/25SL	4MB		$179
	16MB		$769
PowerExec 3/25SL, 3/25SL-C, EL	4MB		$189
	16MB		$769
Premium Exec 286, 386SX/20, 25, 25C	4MB		$149

Compaq

Contura 3/20, 3/25, 3/25c	4MB		$175
	8MB		$325
Contura 4/25 series	4MB		$189
	8MB		$365
LTE 286	4MB		$129
LTE 386S/20	4MB		$229
LTE Lite 20, 25, 25c, 25e	4MB		$229
	8MB		$395
LTE Lite 4/25c	4MB		$219
	8MB		$399
SLT 386s/20	4MB		$199

IBM

NEW AMBRA Trekia	2MB		$112
ThinkPad 300	8MB		$369
PS/2 CL57SX and ThinkPad 700	4MB		$209
700c, 720, 720c	8MB		$389
NEW ThinkPad 710T	4MB		$189
	8MB		$319
N51 Notebook (All)	2MB		$99
	4MB		$189
L40SX N33SX PS/Note 182	4MB		$185
L40SX PS/Note 182	8MB		$359
PS/Note N45SL	2MB		$99

NEC

NEW UltraLite Versa (all models)	4MB		$229
	8MB		$449
	16MB (3.3 volt)		$1139
UltraLite & Cellular Workstation SX/20	2MB		$147
	8MB		$395
UltraLite III, SL/25C	8MB		$359
UltraLite SL/20, SL/20P	4MB		$259

Texas Instruments

TravelMate 3000 (all models)	2MB		$79
TravelMate 4000 (all models)	4MB		$189
TravelMate WinSLC/25	2MB		$129

Toshiba

T1000SE/LE/XE, 2000, 2000SX, SXe, T2200SX, T1800 Series	2MB		$99
	4MB		$179
	8MB		$329
T1200XE, 1600, 3100E	2MB		$89
T3100SX, 3200SX, SXC	2MB		$79
	4MB		$169
T3200	2MB		$159
T3300SL	4MB		$169
	8MB		$399
	16MB		$935
T4400, T6400 (all models)	4MB		$209
	8MB		$399
	16MB		$699
NEW T1900, T4500, T4600, T4700, (all models)	8MB (3.3 volt)		$459
	16MB (3.3 volt)		$1099
T5100	2MB		$89
T5400, T5200, T5200C, T8500	2MB		$89
	8MB		$359

Zenith

NEW Z-Lite 320L	2MB		$159
Z-Note 320L, 320Lb, 325L, 325Lc	2MB		$108
	8MB		$384
NEW Z-Note 425 Series	8MB		$549
Z-Sport 4205, 4255	4MB		$188
Z-Sport 3255	2-6MB		$106
	4MB		$194
MastersPort 386SL, SLC, SLn	2MB		$90
MastersPort 386SX	2MB		$89
SupersPort SX, 286e, SlimsPort	2MB		$139
SupersPort 286e, SlimsPort	4MB		$199

PERSONAL COMPUTER MEMORY

AST

Premmia							
	4MB	501159-001	$152	8MB	501159-002		$369
	16MB	501159-003	$709	32MB	501159-004		$1294
Manhattan SMP							
	16MB	501143-001					$735
Bravo 386 SX, WS/286, 386							
	2MB	500510-002	$84	4MB	500510-008		$169
Bravo 3/25s							
	2MB	500710-004	$96	8MB	500824-002		$319
Advantage! Plus 486DX/33, DX2 50; DX2 66							
	4MB	501168-001	$148	8MB	500824-001		$319
Advantage! 386SX/20, 25, Advantage! Pro SX/25, Bravo 3/33s							
	2MB	500962-001	$89	8MB	500962-002		$289
Advantage! Pro 486DX/33 SX/25 Bravo LC 4/25s, 33, 33s, 50d, 4/66d							
	2MB	500987 001	$72	4MB	500987-002		$159
	16MB	500987 004	$579	32MB	500987-005		$1159
Premium 386/25, 33, 33T, Premium II 386SX/16, 20, 25							
	1MB w/WPB	500780 003 002					$33
Advantage! 486/25, 33, 33p, SX20, Bravo 4/33, 486/25, Premium 4/25, 33TE, Server SE 4/33							
	2MB w/WPB	500718-004 780-005					$69
Premium 386/33T, 386SX/16, Premium II 386SX/20, 25							
	4MB w/WPB	500780-004					$179
Advantage! 486/25, 33, 33p, SX20, Power Premium 3/33, 4/33, 33s, 50d, 66d, Premium 386/33TE, 486/25, 25E, 25TE, 33, 33E, 33TE, Premium II 386/25, 33, 486/33, 486SX/20, Premium Server SE 4/33							
	8MB w/WPB	500780-001					$358

Take a Look at these Savings!

SYSTEM	MEMORY SIZE	MFG. PART	MFG. PRICE	FSI PRICE
Ti 4000	4MB	2581265-001	$279	$189
Toshiba T6400	8MB	PC-PA2005U	$559	$399
IBM PS/Valuepoint	8MB	6450130	$625	$354
Compaq ProLinea 433	8MB	141685-001	$499	$354
AST Bravo 4/33	8MB	500780-001	$469	$358

First Source International offers you savings of over 60%! We stock only the top memory brands such as Paragon and Kingston. Don't buy your memory anywhere else, CALL THE UPGRADE EXPERTS TODAY!

Compaq

ProLinea 3/25s, 3/25zs							
	2MB	141738-001	$89	8MB	141742-001		$319
NEW ProLinea 4/25s, 4/33, 4/50							
	1MB	141682-001	$39	2MB	141683-001		$76
	4MB	41684-001	$181	8MB	141685 001		$354
DeskPro 386-20, 20e, 25							
	4MB Module	113132-001					$180
	4MB Board	113645-001					$244
DeskPro 386s/16							
	4MB Module	112534-001					$180
	4MB Board	113634-001					$255
DeskPro 3/25c 33i, 4/25SS, 33i; 66; 2P4N 386N, 386SX/20; 20N, SystemPro LT Series ProSigma PC Server 486/33, DX2/66 Portable 486c, M Series expansion boards							
	1MB	118680 001	$39	2MB	118689 001		$76
	4MB	118690 001	$181	8MB	112877 001		$354
NEW ProSigma PC Server 486/33, DX2/66							
	16MB	149320 001	$649	32MB	149147-001		$1280
SystemPro XL (486 50)							
	16MB	136816 001	$729	32MB	136817 001		$1409
	64MB	N/A	$2589	128MB	139918 001		$5943
DeskPro 386 33, 486 33 SystemPro SystemPro E series							
	2MB	115144 001	$99	8MB	116561 001		$379
DeskPro 386M, 486M, SystemPro LT System Pro E series							
	2 64MB Board w/2M	129160-001					$275
DeskPro 386/33L, 486/33L, SystemPro							
	6 Socket Brd w/2MB	116569 - 115144-001					$309

Dell

Power Desktop 325D, 325P, 333D, 333P, 433P, 486P, 486D							
	1MB	310 2505	$39	4MB	310 2507		$181
Power Desktop 486P, 486D							
	16MB	310-2625					$640
PowerLine Workstation 420, 425, 433, 450, 450DE/2, 466DE							
	2MB	310 2466	$76	4MB	310-2467		$152
	8MB	310-2468	$362	16MB	310-2469		$640
PowerLine Workstation 420, 425, 433, 450, 450SE/2, 466SE							
	32MB Kit	310-2630					$1280
Performance I, L, & M series							
	4MB	310-3325	$181	16MB	310-3327		$640
Performance ME series							
	4MB	310 3334	$181	8MB	310-3335		$362
	16MB	310-3336	$640	32MB	310 3337		$1280

Hewlett-Packard

Vectra 05/165, 20PC, RS/20, 20C, 25, 25C							
	4MB Kit	D1542 or 1642A					$189
Vectra 386/16N, 386/20N, 386/25N PC							
	2MB	D2406A	$92	8MB	D2404A		$310
Vectra 486PC, 25T, 33T 486s/20; 486/25N, 33N, 50N, 66N							
	2MB	D2381A	$76	8MB	D2152A		$354
	4MB	D2156A/51A	$181	16MB	D2676A		$649
Vectra 386/25, 486/25U, 486/33U, 486/50U, 486/66U							
	2MB	D2381A	$76	8MB	D2152A		$354
Vectra 486/25N, 486/33N, 486/50N, 486/66N							
	16MB	D2676A					$640
Vectra 386/33N 33MI							
	2MB	D2714A	$92	8MB	D2715A		$370

IBM

NEW AMBRA Enterprise 386, Horalia 386, Sprinta 386 (all models)							
	2MB	N/A	$94	8MB	N/A		$329
NEW AMBRA Enterprise 486, Horalia 486, Sprinta 486 (all models)							
	4MB	N/A	$195	16MB	N/A		$659
PS/1 286, 386SX							
	2MB	92F9935	$82	4MB	92F9694		$160
PS/1 Consultant, Essential, Expert models x43, x44, PS/Valuepoint all models except Cxx series							
	4MB	96F9290	$199	16MB	96F9291		$639
PS/1 Consultant, Essential, Expert models x76							
	16MB Kit	96F9291					$639
PS/2 25/286, 30/286, memory adapter 14972259							
	2MB Kit	30F5360					$81
PS/2 35SX, LS 40SX, 50Z, 55SX, LS 65SX, LS 70, 35station							
	1MB	6450603	$39	2MB	6450604		$76
PS/2 70-A21, A61, B21, B61, PS/1 Consultant, Essential, Expert models x11, x13, x14, PS/Valuepoint Cxx series							
	2MB	6450608					$76
PS/2 35SX, LS, 40SX, 55SX, LS, 65SX, LS, 35station, PS/Valuepoint Cxx series adapter board 34F3011 or 34F3077							
	4MB	34F2933 or 87F9977					$181
PS/2 35SX, LS, 40SX, PS/Valuepoint Cxx series							
	8MB	6450129					$354
PS/2 90 XP, 95 XP, P75 (pairs) 56, 57 (all); PS/1 Pro M2123							
	2MB	6450902					$76
PS/2 90 XP, 95 XP, P75 (pairs) 56, 57 (all) PS/1 Consultant, Essential, Expert models x11, x13, x14, PS/1 Pro M2123, RS/6000 POWERstation/POWERserver 220 series							
	4MB	6450128	$181	8MB	6450130		$354

IBM Continued

PS/2 80-111; 311; 121; 321; 001; 161							
	2MB	6450379					$103
PS/2 80 A21, A31, A16							
	4MB	6451060					$119
Expansion boards for 50, 50Z, 55SX, 60, 65SX							
	2-8MB w/2MB	1497259					$199
	4-16MB w/4MB	6450409					$379
Expansion boards for all models 70, 80							
	2 14MB w/2MB	34F3077					$226
	4 16MB w/4MB	34F3011					$317

NEC

NEW Image 425, 433, 466							
	4MB	410 12002	$181	16MB	410 12003		$647
NEW Ready 425, 433							
	4MB	N/A	$195	16MB	N/A		$649
PowerMate 386/33; Express Te e series							
	4MB	OP-410-6205	$181	16MB	OP-410-6206		$640
PowerMate 286/12, SX/16 SX/20							
	2MB Kit	OP 410 8103					$96
PowerMate 386SX/20s, 20w, 16r 25r 486/50r, 486/33i							
	8MB Kit	OP 410 2101					$319
PowerMate SX Plus							
	2MB	N/A					$235
	4MB	N/A					$318
PowerMate SX/20							
	2MB CPU Upgrade	OP-410-8101					$159
	2MB Exp. Board	OP-410-8102+8103					$180
PowerMate 386/20, 25							
	2MB	APC H655					$229
	8MB	APC-H656					$679
PowerMate 386/33E, 486/25E							
	2MB	OP-410-5101					$165

Zenith

NEW Z 300/400 Series Plus Z-420/SX, Z-425/SX, Z-433/DX, Z-433/SX			
	4MB	ME 100	$181
	16MB	ME-90	$640
Z Server 4255E, 4330E, 4500E			
	4MB	ME-432	$152
	8MB	ME-102	$362
	16MB	ME-442	$708
	32MB	ME 92	$1280
NEW Z Station 3255h, 3255n, 4205Eh, Sh, Sn, 4255h, 4330eh, 4330h, 4500Een			
	1MB	ME 70	$39
	4MB	ME 100	$181
Zenith Z 386/20, 25, 33, 33E			
	1MB	ZA3800ME	$39
	4MB	ZA3800MK	$181
Zenith Z 386SX/20, 286LP-, Z-LS			
	2MB Kit	Z-605-1	$92
Zenith 486/33ET, 25E			
	4MB	ZA4200ME2	$181
	16MB	ZA4200MB	$640

TWO DAY SHIPPING $5.00

LASER PRINTER MEMORY

Brother HL-4							
	2MB	MB-420	$147	4MB	MB-440		$225
Brother HL-8e, HL-8d, HL-8							
	1MB	MB-810	$80	2MB	MB-820		$120
Brother HL 10V/DV							
	2MB	MB-1020	$119	4MB	MB-1040		$219
Canon LBP-4SX							
	1MB	R03-0010-000	$108	2MB	R03-0020-000		$189
Canon LBP-4, 4Lite, 4Plus							
	1MB	S63 2230	$106	2MB	N/A		$145
Canon LBP-8II, 8IIR, 8IIT							
	2MB	S63-1880	$111	4MB	N/A		$189
Canon LBP-III, IIIT Plus							
	2MB	S63-2350					$145
Compaq PAGEMARQ 15, 20							
	4MB	126360-001	$194	8MB	126361-001		$376
Epson EPL 6000							
	2MB	105401	$120	4MB	N/A		$198
Epson ActionLaser II, EPL 8000							
	2MB	N/A	$135	4MB	N/A		$213
Epson EPL 7500							
	2MB	C822051	$149	4MB	C822021		$235
HP LaserJet 4I							
	1MB	C2074A					$47
HP LaserJet IIP, IIP, IIID							
	2MB	33475B	$97	4MB	33477B		$170
HP LaserJet II, IID							
	2MB	33444B	$110	4MB	33445B		$195
HP LaserJet IIIsi 4 4M, 4Si, 4SiMX, 4LX00 DeskJet 1200c							
	1MB	C2063A	$39	2MB	C2064A		$76
	4MB	C2065A	$181	8MB	C2066A		$354
HP DeskJet 500, 500C							
	256K	22707B					$40
HP DesignJet 600 Inkjet Plotter							
	4MB	C2065A	$181	8MB	C2066A		$354
IBM/Lexmark Laser 4029 All Models							
	2MB	1183334	$96	4MB	1183335		$157
IBM/Lexmark Laser 4019, 4019e							
	2MB	1039137	$115	3.5MB	1038675		$173
IBM/Lexmark Laser 4039, 4079 All Models							
	4MB	1328363	$167	8MB	1328365		$326
Kyocera FS-1500A Ecosys							
	2MB	N/A	$141	4MB	N/A		$282
Kyocera FS-3500A Ecosys eSi							
	1MB	N/A	$45	4MB	N/A		$167
NEC SilentWriter 95 & 97 series							
	2MB	N/A					$100
OkiLaser 400							
	1MB	70014701	$67	2MB	N/A		$106
OkiLaser 800, 820							
	2MB	N/A	$157	4MB	N/A		$190
OkiLaser 810							
	1MB	70021001	$93	2MB	70021101		$132
OkiLaser 830 840							
	2MB	70016501					$126
Panasonic LaserPartner 4410 4430							
	2MB	KX P444	$113	4MB	N/A		$191
Panasonic LaserPartner 4450I 4420							
	2MB	KX P441	$129	4MB	N/A		$189
Panasonic LaserPartner 6455							
	2MB	KX-P442					$169
Texas Instruments MicroLaser, XL							
	1MB	2555739-0001					$46
Toshiba Page Laser 6							
	2MB	L56 NB0090	$120	4MB	L56-NB0100		$198

PRINTER ACCESSORIES

Pacific Data Products

PacificPage 4 HPLJ 4	$269
PacificPage PE	$279
PacificPage PE/XL includes 4 MB SIP, III, IIID, IIIP	$769
Pacific DirectNet (512K)	$339
Pacific Connect Xi (256k) 5 ports II, IID, III, IIID	$329
Pacific Connect Xi (256k) 7 ports IIPs, 4	$489
25 in One!	$259

CALL THE UPGRADE EXPERTS

& MUCH MORE . . .

MULTIMEDIA SPECIALS!

CREATIVE
CREATIVE LABS INC

Give your PC awesome audio power with Sound Blaster™ 16 ASP, the best selling stereo sound solution. Features professional, high quality 16 bit stereo sound and over $500 of software

Sound Blaster Deluxe	$75
Sound Blaster Pro Deluxe	$119
Sound Blaster 16 ASP	$219

SOUND CARDS

Computer Peripherals Inc.

ViVa Maestro Pro (speakers included)	$159
ViVa Maestro 16 (16 bit card)	$199
ViVa Maestro 16 VR (with ... recognition)	$259

Media Vision

Media Vision Pro Audio Spectrum Basic	$119
Media Vision Pro Audio Spectrum 16	$139
Media Vision Pro Audio Studio 16	$169

MULTIMEDIA KITS

Creative Labs

Creative Labs Discovery 8 -bit, Internal	$389
Creative Labs Discovery 16- bit, Internal	$449
Creative Labs Edutainment 16 bit, Internal	$539
Creative Labs Digital Edge CD, Internal	$719

Media Vision

Media Vision Fusion CD16 Internal	$419
Media Vision Double Fusion CD16 Internal	$519
Media Vision Pro16 Multimedia SYS II Internal	$619
Media Vision Pro16 Multimedia SYS III Internal	$809

CHINON

New!

CHINON 535 CD-ROM DRIVES

Dual Speed, Multisession - A Multimedia Workhorse!

- Exceeds MPC2 and QuickTime standards
- Multisession Photo CD compatible
- 220ms average access time
- Double speed 300K sec data transfer rate
- Internal or external versions available
- Features a 256K data buffer
- Complete with interface kit

CDS 535 Internal with caddy w/ a controller	$370
CDX 535 External with caddy w/ c controller	$500

EXPANSION BOARDS

BocaRam AT Plus

2 8MB memory board for 286 & 386 machines. Conventional expanded (LIM EMS 4.0) and/or extended memory

Including 2MB	$160	Including 4MB	$244
Including 6MB	$327	Including 8MB	$411

BocaRam 8-bit

Up to 2MB of expanded memory for IBM PC/XT/ATs PS/2 Models 25 30 30 286 & compatibles

Including 1MB	$131	Including 2MB	$181

BocaRam AT I/O Plus

2 4MB memory board with 1 ser and 1 par port. Includes cables

Including 2MB	$169	Including 4MB	$269

KINGSTON

UPGRADE YOUR 286 TO A 386 OR 486!

SX/Now! 386 CPU upgrade

25MHz (SX)	$169	33MHz (SX)	$199

SLC/Now! 386 or 486 CPU upgrade

25MHz (SLC)	$219	50MHz (SLC)	$299

486/Now! 486 CPU upgrade

25MHz (SX)	$399	33MHz (DX)	$579

MCMaster 486 CPU and up to 64MB of RAM

25MHz (SX) 0MB	$699	With 4MB add	$781
33MHz (DX) 0MB	$959	With 8MB add	$1264

VIDEO CARDS

Diamond

Stealth Pro 1MB	$259
Stealth Pro 2MB	$349
Stealth Pro VLB 1MB	$259
Stealth Pro VLB 2MB	$359
Viper VLB 2MB	$399
Stealth 24 1MB	$169

ATI

Graphics Ultra Plus 2MB	$239
Graphics Ultra Pro 2MB	$359

HERCULES

AWARD WINNING SPEED COMBINED WITH HIGH RESOLUTION AND TRUE COLOR!

These VRAM based boards for ISA AND VL bus computers support ultra high refresh rates making extended work sessions more comfortable

Graphite ISA 1MB	$279
Graphite VL 2MB	$399

Fast DOS - Fast Windows - Runs Everything!

For ISA and VL bus computers. Screaming fast Windows performance and complete compatibility with all ET4000 drivers. 1MB upgradeable or 2MB DRAM models

Dynamite 1MB	$169
Dynamite+ 1MB	$169

HARD DRIVES

Seagate

106MB ST3120A 15ms, IH, 3.5" IDE with 16 bit kit	$209
130MB ST3144A 15ms, IH, 3.5" IDE with 16 bit kit	$199 $219
260MB ST3290A, 16ms, IH, 3.5" IDE with 16 bit kit	$279 $299
1420MB ST41650N 15ms, IH, 5.25" SCSI with 16 bit kit	$1899 $2049

PROCESSORS

Intel Math Coprocessors

80387SX-16 20-25MHz	$85
80387DX-16 20 25 33MHz	$89
80387SL Mobile 16 20 25MHz	$89

Intel OverDrive Processors

486SX20 with socket	$325
486SX25 with socket	$438
486DX25 without socket	$439
486DX33 without socket	$554
486DX33 or 486SX33 with socket	$555

Cyrix

Cx486DRx 16 32	$269
Cx486DRx 20 40	$319
Cx486DRx 25 50	$369
Cx486SRx 16 32	$269
Cx486SRx 20 40	$369

MEGAHERTZ

For Laptop and Notebook Systems.

PCMCIA 2.0 Data/Fax with XJACK

14 400bps FAX/Modem	$329
24/9600bps FAX Modem	$209

Internal Data/Fax w/MNP-5, V.42/V.42bis

14 400bps FAX/Modem	$419
96/9600bps FAX/Modem	$399
24/9600bps FAX Modem	$209

Pocket Modems for any serial port

14 400bps FAX Modem	$319
96/9600bps FAX Modem	$275

FAX/MODEMS

U.S. Robotics

Sportster 14 400 fax External	$179
Sportster 14 400 fax Internal	$159
Courier V 32 terbo fax with ASL External	$404
Courier V 32 terbo fax with ASL Internal	$365
Courier V 32 terbo with ASL External	$385
Courier V 32 terbo with ASL Internal	$345

Hot Deal

BOCA RESEARCH INC

Editor's Choice

External 14 400bps data/14 400send and receive fax v 32bis v 42bis MNP5 protocol throughput to 57 600bps includes communications software for DOS and Windows! $169

ADI

"Mainstream Choices!"

MicroScan/ADI

- **MicroScan 3E+** 14" 0.28mm 1024x768 NI @ 72Hz Microprocessor based digital controls 30K 60KHz $359
- **MicroScan 4G** 15" FST 0.28mm 1280x1024 NI @ 60Hz Microprocessor based digital controls 30K 64KHz $449
- **MicroScan 5A** 17" FST 0.26mm 1280x1024 NI @ 60Hz Microprocessor based digital controls 30K 64KHz $869

MONITORS

Hitachi

SuperScan 15 1024x768 NI @ 70Hz 28mm	$469
SuperScan 17 FST 1280x1024 NI @ 60Hz 28mm	$969
SuperScan 20s FST 1280x1024 NI @ 60Hz 31mm	$1429

ADI

MicroScan 2E 14" 28 dot pitch 1024x768 NI	$289
NEW MicroScan 3E+ 14" 28 dot pitch 1024x768 NI @ 72Hz	$359
MicroScan 3G 14" 28dot pitch Hi-res RGB color adjust	$369
MicroScan 4G 15" 28 dot pitch Flat Hi-res monitor	$449
MicroScan 5A 17" 26dot pitch Flat Hi-res man degauss	$869

30 DAY MONEY BACK GUARANTEE

WE SET THE STANDARD:

- MEMORY GUARANTEED - 100% COMPATIBLE IN FORM, FIT, AND FUNCTION
- ALL PRODUCTS USER INSTALLABLE
- INSTALLATION INSTRUCTIONS INCLUDED WITH MOST MEMORY PRODUCTS
- FREE TECHNICAL SUPPORT
- THOUSANDS OF ITEMS IN STOCK
- CORPORATE PO'S, APO/FPO'S WELCOME
- GOVERNMENT AND EDUCATIONAL PRICING
- INTERNATIONAL ORDERS WELCOME
- SPECIAL VOLUME PRICING
- OVERNIGHT DELIVERY AVAILABLE
- NO SURCHARGE ON CREDIT CARDS

DON'T SETTLE FOR LESS!

CALL FOR ANY MEMORY UPGRADE NOT LISTED

WE STOCK MEMORY UPGRADES FOR THOUSANDS OF COMPUTERS AND PRINTERS

TOLL FREE FROM THE US OR CANADA
800-303-9866

INTERNATIONAL ORDERS
714-448-7750

FAX ORDERS
714-448-7760

Business hours:
Monday - Friday, 8am-5pm, P.S.T.
Saturday, 9am-3pm, *(Orders Only Please)*

First Source International

Mail or fax orders to:
First Source International, Inc.
7 Journey
Aliso Viejo, CA 92656

CIRCLE 014 ON READER SERVICE CARD

▶ 800-303-9866 ◀

24-Hour Free Technical Consultation · One-Year Limited Warranty · Next-Day Shipping · One-Year On-Site Service · 24-Hour Fax Technic

High Quality, Low Price!

NEW PRODUCTS & LOWER PRICES

Get precisely the right amount of PC performance and features you need—*ready to ship in 48 hours.* Designing your built to order Inmac PC is a snap. Every Inmac System is manufactured for Inmac by IBM. Call us, and our team of experienced advisors will guide you through every step of the process or you can do it yourself following the easy steps below.

MANUFACTURED FOR INMAC BY IBM.

Inmac 486 PCs are American engineered and manufactured with award-winning quality.

17 Years of the best value and service.

Since 1976, Inmac has been recognized for superior service, the broadest PC and Networking product selection and exceptionally low prices.

Fast delivery.

Order a pre-configured or customized Inmac PC, and we'll ship it in just 48 hours.

1-year on-site service, guaranteed.

If your Inmac PC system fails due to an Inmac diagnosed hardware failure, we will send a service representative with parts. If they don't arrive when promised, we'll give you a $25 credit on your next order of $100 or more. (*Some remote areas may take up to three business days for service. Call for information.*)

1-year limited warranty.

Inmac PC systems come with a one year on-site parts and labor warranty against defects in material or workmanship.

Toll-Free 24-hour technical advice.

We've built an ace staff of experts whose sole job is to answer your technical questions... at no charge to you.

30-day satisfaction guarantee.

If you're not satisfied with an Inmac PC product, contact customer service for a return material authorization, and return it within 30 days for a refund of the original purchase price. (*Shipping/handling charges are not refundable.*)

BUILT TO ORDER BTO BUILT TO ORDER

inmac

Inmac is not responsible for any typographic errors contained in this offer. Please call to verify price and product information.

Each Inmac PC system comes standard with DOS, MS-Windows and an enhanced 101 keyboard & mouse; as well as:

- Accelerated local bus video
- 4 MB RAM
- 3 1/2" Floppy Drive
- VL-Bus Video, VL-Bus IDE & VL Bus Slot (VP models only.)
- 4 Drive bays
- 5 ISA Expansion slots
- 170 MB Drive
- 14" .28 NI SVGA monitor

SYSTEM

1 ☐	450SL – IBM 486SLC2 25/50 Mhz CPU	$1299
2 ☐	433P – Intel 486DX/33 CPU	$1449
3 ☐	450P – Intel 486DX2/50 CPU	$1499
4 ☐	466P – Intel 486DX2/66 CPU	$1699
5 ☐	433VP – Intel 486 DX/33 CPU VESA	$1576
6 ☐	450VP – Intel 486 DX 2/50 CPU VESA	$1646
7 ☐	466VP – Intel 486 DX 2/66 CPU VESA	$1848

If you need more features and peripherals just check off each option to specify your own perfect system. Add the price for each option to the basic system price listings above, or simply call Inmac for an instant quote.

MEMORY (UPGRADE TO)

8 ☐	8 MB RAM (extra 4 MB)	ADD	$200
9 ☐	16 MB RAM (extra 12 MB)	ADD	$600
10 ☐	32 MB RAM (extra 28 MB)	ADD	$1400
11 ☐	64 MB RAM (extra 60 MB) (not available on 450SL)	ADD	$3000

Call for latest pricing.

CACHE

12 ☐	128 KB cache (not available on 450SL)	ADD	$35
13 ☐	256 KB cache (not available on 450SL)	ADD	$59

VIDEO RAM

14 ☐	2 MB VRAM (extra 1 MB on VESA Professional Series only.)	ADD	$20

HARD DRIVES (UPGRADE TO)

15 ☐	255 MB IDE	ADD	$40
16 ☐	340 MB IDE	ADD	$95
17 ☐	540 MB IDE	ADD	$429
18 ☐	540 MB (requires SCSI interface adapter)	ADD	$350
19 ☐	1 GB (requires SCSI interface adapter)	ADD	$695

ADDITIONAL FLOPPY DRIVES

20 ☐	Additional 5 1/4" FDD	ADD	$65
21 ☐	Replace w/ Dual 3 1/2" and 5 1/4" FDD	ADD	$60

CD ROM DRIVES

22 ☐	NEC 510 (450 KB/S) (requires SCSI interface adapter)	ADD	$389
23 ☐	NEC 210 (350 KB/S) (requires SCSI interface adapter)	ADD	$199
24 ☐	Panasonic 563 (300 KB/S) (adapter included)	ADD	$199

TAPE BACK-UP DRIVE

25 ☐	250 MB Qic-80	ADD	$179

ADAPTERS

26 ☐	16-bit fast SCSI adapter	ADD	$175
27 ☐	SCSI adapter (for CD-ROM drives)	ADD	$49

MONITOR (UPGRADE TO)

28 ☐	15" .28 MI SVGA Monitor	ADD	$100
29 ☐	17" .28 NI SVGA Monitor	ADD	$575

NETWORKING/COMMUNICATIONS

30 ☐	3Com Etherlink III TP	ADD	$99
31 ☐	3Com Etherlink III Combo	ADD	$130
32 ☐	4/16 Token Ring	ADD	$399
33 ☐	Internal 9600/2400 Fax/Modem—w/Prodigy	ADD	$60
34 ☐	Internal 14.4K Baud Fax/Modem	ADD	$205

MULTIMEDIA

35 ☐	Creative Labs Sound Blaster 16 Sound Card	ADD	$199
36 ☐	Media Vision Pro Audio Studio 16 Sound Card	ADD	$209
37 ☐	Labtec Quality Speakers	ADD	$29

SOFTWARE**

38 ☐	Lotus AMI Pro	ADD	$199	39 ☐	Lotus 1-2-3	ADD	$279
40 ☐	Lotus Freelance	ADD	$319	41 ☐	Lotus SmartSuite	ADD	$399
42 ☐	Microsoft Word	ADD	$299	43 ☐	Microsoft Excel	ADD	$299
44 ☐	Microsoft PowerPoint	ADD	$299	45 ☐	Microsoft Office	ADD	$459
46 ☐	WordPerfect	ADD	$279	47 ☐	Borland Quattro Pro	ADD	$39
48 ☐	Borland Paradox	ADD	$119	49 ☐	Borland Office	ADD	$349
50 ☐	Claris Clarisworks	ADD	$99	51 ☐	Intuit Quicken	ADD	$39

**Software programs are for MS Windows.

PRIORITY CODE: K14602

Please use your priority code when ordering.

Our low cost leasing plan makes everything affordable right now. Call Toll Free 1-800-972-9240 for details.

CALL TOLL FREE 1-800-972-9240

FAX 1-800-972-2210 · In Canada, call 1-800-387-2173. Prices and delivery may differ, please inquire.

486 PCs SHIPPED IN 48 HOURS!

When you need it right away and you're not ready to compromise quality or service, you need Inmac's *ready to roll* 486 PC line manufactured by IBM and serviced by Inmac. Nobody does it better. And at such low prices!

Only Inmac offers so many imaginative features giving you what you want *when* you want it. Our unique selection of pre-configured PCs are fully backed by Inmac's legendary service guarantees. Just select the PC that fits your needs and call us toll free 1-800-972-9240. We'll ship it in just 48 hours!

NEW LOWER PRICES

***NEW!* 3X CD-ROM.**

450SL $1299

- EPA Energy Star compliant with Power Sentinel.
- IBM 486SLC2 25/50 MHz processor.
- Supports industry standard co-processor.
- Accelerated local bus video with 1 MB RAM.
- True-color display modes up to 16 million colors.
- 4 MB RAM expandable to 32 MB.
- 170 MB IDE (16ms) hard drive.
- 3.5" 1.44 MB floppy drive.
- 5 available ISA slots.
- 4 drive bays (3.5" int, 3.5" ext, two 5.25" ext)
- 14" .28mm, NI multiscan SVGA monitor.
- 2 serial and 1 parallel port, keyboard and mouse.
- Pre-loaded with MS-DOS and MS-Windows.

Order Number: K1005PC (Lease Rate: $46/mo.) $1299

466M-VP $2860

- Intel 486DX2 66MHz processor.
- 8 MB RAM expandable to 64 MB.
- 128 KB cache expandable to 256 KB.
- 255 MB IDE (16ms) hard drive.
- 3.5" 1.44 MB internal floppy drive.
- NEC 510 Triple speed CD-ROM drive (450 KB transfer rate, 200ms access).
- Media Vision Pro Audio 16 sound card.
- Two high-quality speakers.
- 15" .28mm NI multiscan SVGA monitor.
- Accelerated VESA local bus video with 1 MB RAM upgradeable to 2 MB.
- 5 ISA with 1 VESA slot.
- VESA VL-bus IDE controller
- 4 drive bays (3.5" int, 3.5" ext, two 5.25" ext).
- 2 serial and 1 parallel port, keyboard and mouse.
- Pre-loaded with MS-DOS and MS-Windows.

Order Number: K1205PC (Lease Rate: $104/mo.) $2860

433P $1449

- Intel 486DX 33 MHz processor.
- Accelerated local bus video with 1 MB RAM.
- True-color display modes up to 16 million colors.
- 4 MB RAM expandable to 64 MB.
- Supports up to 256 KB second-level cache.
- Pentium Technology-ready.
- 170 MB IDE (16ms) hard drive.
- 3.5" 1.44 MB floppy drive.
- 5 available ISA slots.
- 4 drive bays (3.5" int, 3.5" ext, two 5.25" ext)
- 14" .28mm, NI multiscan SVGA monitor.
- 2 serial and 1 parallel port, keyboard and mouse.
- Pre-loaded with MS-DOS and MS-Windows.

Order Number: K1002PC (Lease Rate: $51/mo.) $1449

450P NEW LOWER PRICES $1499

- Intel 486DX2 50MHz processor.
- Accelerated local bus video with 1 MB RAM.
- True color display modes up to 16 million colors.
- 4 MB RAM expandable to 64 MB.
- Supports up to 256 KB second-level cache.
- Pentium Technology-ready.
- 170 MB IDE (16ms) hard drive.
- 3.5" 1.44 MB floppy drive.
- 5 available ISA slots.
- 4 drive bays (3.5" int, 3.5" ext, two 5.25" ext).
- 14" .28mm. NI multiscan SVGA monitor.
- 2 serial and 1 parallel port, keyboard and mouse.
- Pre-loaded with MS-DOS and MS-Windows.

Order Number: K1003PC (Lease Rate: $55/mo.) $1499

466P NEW LOWER PRICES $1699

- Intel 486DX2 66MHz processor.
- Accelerated local bus video with 1 MB RAM.
- True-color display modes up to 16 million colors.
- 4 MB RAM expandable to 64 MB.
- Supports up to 256 KB second-level cache.
- Pentium Technology-ready.
- 170 MB IDE (16ms) hard drive.
- 3.5" 1.44 Mb floppy drive.
- 5 available ISA slots.
- 4 drive bays (3.5" int, 3.5" ext, two 5.25" ext)
- 14" .28mm NI multiscan SVGA monitor.
- 2 serial and 1 parallel port, keyboard and mouse.
- Pre-loaded with MS-DOS and MS-Windows.

Order Number: K1004PC (Lease Rate: $60/mo.) $1699

433VP+ $2099

- Intel 486DX 33 MHz processor
- Accelerated VESA local bus video with 1 MB VRAM
- True-color display modes up to 16 million colors
- 5 available ISA slots with 1 VESA VL-bus slot
- VESA VL-bus IDE controller
- Pentium Technology-ready (ZIF socket)
- 8 MB RAM expandable to 64 MB
- 128 KB cache expandable to 256 KB
- NEC 210 double-speed CD-ROM drive
- 255 MB IDE (16ms) hard drive
- 3.5" 1.44 MB floppy drive
- 4 drive bays (3.5" int, 3.5" ext, two 5.25" ext)
- 14" .28mm NI multiscan SVGA monitor
- 2 serial and 1 parallel port, keyboard and mouse
- Pre-loaded with MS-DOS and MS-Windows

Order Number: K1206PC (Lease Rate: $72/mo.) $2099

450VP+ NEW LOWER PRICES $2269

- Intel 486DX2 50MHz processor
- Accelerated VESA local bus video with 1 MB VRAM.
- True-color display modes up to 16 million colors.
- 5 available ISA slots with 1 VESA VL-bus slot
- VESA VL-bus IDE controller
- Pentium Technology-ready (ZIF socket)
- 8 MB RAM expandable to 64 MB
- 128 KB cache expandable to 256 KB
- NEC 210 double-speed CD ROM drive
- 255 MB IDE (16ms) hard drive
- 3.5" 1.44 MB floppy drive
- 4 drive bays (3.5" int, 3.5" ext, two 5.25" ext)
- 15" .28mm, NI multiscan SVGA monitor
- 2 serial and 1 parallel port, keyboard and mouse
- Pre-loaded with MS-DOS and MS-Windows

Order Number: K1207PC (Lease Rate: $78/mo.) $2269

466VP+ NEW LOWER PRICES $2740

- Intel 486DX2 66MHz processor
- Accelerated VESA local bus video with 1 MB VRAM
- True-color display modes up to 16 million colors
- 5 available ISA slots with 1 VESA VL-bus slot
- VESA VL-bus IDE controller
- Pentium Technology-ready (ZIF socket)
- 8 MB RAM expandable to 64 MB
- 256 KB second level cache
- NEC 510 Triple-speed CD-ROM drive
- 340 MB IDE (16ms) hard drive
- 3.5" 1.44 MB floppy drive
- 4 drive bays (3 5" int, 3.5" ext, two 5.25" ext)
- 15" .28mm, NI multiscan SVGA monitor
- 2 serial and 1 parallel port, keyboard and mouse
- Pre-loaded with MS-DOS and MS-Windows

Order Number: K1208PC (Lease Rate $92/mo.) $2740

CIRCLE 054 ON READER SERVICE CARD

CALL TOLL FREE 1-800-972-9240

FAX 1-800-972-3210 for Canada call 1-800-387-9178. Prices and delivery may differ, please inquire.

inmac

PRIORITY CODE K14602

Please use your priority code when ordering.

PCSources Says . . .
Kenosha Computer Center offers some of the Best Buys in Mail Order!

EXPERIENCE THE KENOSHA DIFFERENCE
- *Over Six Years of Service*
- *Thousands of Satisfied Customers*
- *Terrific Technical Support*
- *Everyday Low Prices*
- *No Surcharge on Credit Cards*

KENOSHA COMPUTER CENTER
YOUR DIRECT SOURCE FOR VALUE AND SERVICE
CALL US TODAY!

EPSON

FX 870	$259	FX 1170	$345
LQ 570+	$235	LQ 870	$425
LQ 1070	$355	LQ 1170	$589
DFX 5000	$1299	LQ 2550	$879

STYLUS 800 INKJET $279
STYLUS 300 INKJET $239
ACTION 1000 6PPM, 14 FONTS $579
ACTION 1500 6PPM, PCL5 ..... $639

ActionNote 486SLC/33
120mg, 4mg, FAX modem, trackball, DOS, Windows, 1 yr. on site wrnty. $1619

KENOSHA COMPUTER CENTER

SALES LINE OUTSIDE WISCONSIN

1-800-255-2989

Shipping, customer service & technical assistance call
414-697-9595 ▪ FAX 414-697-0620
VISA, MASTERCARD, AMERICAN EXPRESS & DISCOVER

HEWLETT-PACKARD

LASERJET IV/IVM	$1369/$1929
LASERJET IVP/IVMP	$989/$1379
LASERJET IVL/IVML	$675/$1039
LASERJET IVSI/IVSIMX	$2989/$4499
JET DIRECT	$399
2MG/4MG/8MG UPGRADE	CALL
IIP/IIC SCANNER	$719/$979
DESKJET 500/500C	$309/$409
DESKJET 550C	$575
DESKJET 1200C/1200C/PS	$1369/$1939

OKIDATA

ML320/ML321	$295/$415
ML520/ML521	$369/$489
ML590/ML591	$415/$569
ML380/ML395	$209/$959
ML395C	$1029
PM3410	$1199
OL400E/OL410E 600DPI	$495/$669
OL810/OL830	$899/$1089
OL850+	$1199
OKIDATA 400E 2MG	$155

Panasonic Office Automation

2023/1124i	$199/$229
2180/2123	$169/$229
2124/2624	$295/$359

Canon

"BubbleJet" Printers

BJ 10ex	$239
BJ 200	$285
BJ 230	$389
BJ 600C	$579
BJC 800	$1449
BJC 820	$1579

BJC 600
Full 4 Color Process for a Multitude of Colors!
360 DPI, 240cps, 100 sheet auto feed, Canon, Epson & IBM emul. plus 2 year warranty

Innova NX M25-120
486SX-25 Notebook $1499
- 4 mg ram
- Fax Modem
- 120mg HD
- DOS Windows
- Built-in Trackball

NOTEJET 486 SLC/25
Built-in Bubblejet Printer
4 MG RAM, 2 PCMCIA SLOTS, DOS & WINDOWS
135 MG **$2349** 180 MG **$2549**

MODEMS & FAX MODEMS

PRACTICAL PERIPHERALS

PRACTICAL PER 14.4 POCKET	$269
PRACTICAL PER 14.4 PCMCIA	$265
PRACTICAL PER 14.4 INT/EXT	$159/169

HAYES

HAYES 14.4 POCKET	$299
HAYES 14.4 PCMCIA	$269
HAYES OPTIMA 14.4 W/FAX	$369
HAYES ACCURA 14.4 W/FAX	$199

U.S. ROBOTICS

Sportster 14.4 Int	$145
Sportster 14.4 Ext	$159
Sportster 14.4 Int. w/fax	$149
Sportster 14.4 Ext. w/fax	$159
Dual Standard 16.8	$659
World Port 14.4 Pocket	$325

Intel Satisfaxtions Below

intel OVERDRIVE

PROCESSOR UPGRADES
- For any Intel 486 based system
- Improves system performance up to 70%
- Accelerates all DOS, Windows, OS/2 and Unix applications
- Cost effective upgrade to next generation CPU technology

Overdrive Upgrade SX20/25 ..... $279/$295
Overdrive Upgrade DX25/33 ..... $295/$475

HARD DRIVES & TAPES
SEAGATE & MICROSOLUTIONS

SEAGATE 120 MB 3144A	$175
SEAGATE 260 MB 3290A	$225
SEAGATE 452 MB 3550A	$409
SEAGATE 1 GB SCSI 11200N	$939
BACKPACK 170/250 MB	$375/$459
BACKPACK 250 MB EXT. TAPE	$349

TAPE BACK UP

Colorado Tracker 250	$319
Colorado Tracker 120	$275
Colorado Jumbo 250	$159
Colorado Jumbo 120	$119
Colorado 2 GB EXT	$1069
Colorado 4 GB EXT	$1639
Qic 80 tapes	$20

SOFTWARE

ALDUS PAGEMAKER	$519
DBASEIV 1.5/2.0	$399/$409
LOTUS 123 VER 2.4/3.4	$279/$325
LOTUS FOR WINDOWS	$279
MICROSOFT EXCEL/WINDOWS	$289
MICROSOFT WORD/WINDOWS	$299
NORTON UTILITIES 7.0	$99
PARADOX 4.0 DOS	$425
WORD PERFECT WINDOWS 6.0	$269
ALL OTHER TITLES	CALL

TEXAS INSTRUMENTS

486 WINSX 120	$1835
486 4000E SX/25 120MB Color	$2119
486 DX2/40 200 MB Color	$2889
486 DX2/50 Mono	$2699
486 4000E DX2/50 200MB ACTIVE COLOR	$3749

CALL FOR ALL OPTIONS

MONITORS

Mitsubishi Diamond Scan 15FS	$479
Mitsubishi Diamond Pro 17"	$1019
Mitsubishi HL 6955 20"	$1759
Mitsubishi Diamond Pro 21FS	$2149
NEC 3FGE/3V	$579/$499
NEC 4FGE	$679
NEC 5FG/5FGP	$1245/$1319
NEC 6FG/6FGP	$2249/$2289
Nanao 340 IW/F550 I	$689/$995
Nanao T650 I	$1649
Viewsonic 15	$429
Viewsonic 17	$949
Viewsonic 20	$1529
Viewsonic 21	$1789
CTX 5468A/1451	$249/$279
CTX 1560/1760	$379/$719

GRAPHICS CARDS

ATI VGA WONDER XL 24 1MB	$119
ATI GRAPHICS ULTRA+ 1MB	$199
ATI GRAPHICS ULTRA PRO 1MB	$329
DIAMOND Speedstar PRO 1 MB	$129
DIAMOND STEALTH VLB 1MB	$159
DIAMOND VIPER 2MB	$389
ORCHID FAHRENHEIT 1280 1 MB	$155
ORCHID FAHRENHEIT VA 1MB	$179

intel

Satisfaxtion Fax Modems

200 2400 V.42/9600 Fax	$199
400 int 14.4/14.4 Fax	$259
400 ext 14.4/9600 Fax	$295
FAX MODEM 14.4-14.4 int	$145
FAX MODEM 14.4-14.4 ext	$165
PC MCIA 24/96	$179
PC MCIA 14.4/14.4	$269
All Intel Networking Products	Call

MEMORY PRODUCTS

2MB IBM 30-286	$125
2MB IBM PS1 386	$129
4MB IBM THINKPAD 700.700C	$229
4MB TOSHIBA 2000.2200.1850C	$199
1&4 MB SIMMS	CALL
2 MB FOR PANASONIC 4410	$125
2 MB FOR OKI 400	$125
2 MB FOR EPSON ALII	$129
2 MB FOR H-P IIP.IIIP&III	$109
BOCA RAM Ok FOR AT OR PSII	$99
FOR ALL OTHER MODELS & MFG	CALL

CO-PROCESSORS & DOUBLERS

INTEL

80287 XL/XLT	$75
80387 SL	$75
80387 SX	$75
80387 DX	$85

CYRIX

80387 SX-33	$75
80387 DX-40	$85
CX486DRx2-16/32	$259
CX486DRx2-20/40	$295
CXD486DRx225/50	$335

BATTERY BACKUPS
AMERICAN

250/400	$99/$155
450/600	$185/$259
900/1250VX	$369/$485
SMART UPS 400	$289
LINE R 1250 POWER COND.	$169
SURGEARREST + W/TEL	$55

MULTIMEDIA & CD ROMS

Pro Audio Spectrum Basic	$135
Soundblaster 16 Basic	$135
DSP Port Sound for Laptops	$145
Toshiba 3401 INT	$389
Toshiba 3401 EXT	$489
NEC Multispin 38	$249
NEC 3xi/3xe Triple Spin	$439/$549

DIGITIZERS

Summasketch 12x12	$255
Summasketch 12x18	$499
Summasketch 24x36	$1249

NETWORKING

NETWARE 3.12 5 USER	$579
NETWARE 3.12 10 USER	$1299
NETWARE 3.12 25 USER	$1849
NETWARE 3.12 50 USER	$2349
NETWARE 4.0	CALL
NE 2000	$119
LANTASTIC NODERUNNER ST. KIT	$429
LANTASTIC NODERUNNER ADT	$175
3COM 3C509	$119
3COM 3C509 5 PAK	$505
INTEL ETHER 16	$89
INTEL ETHER 16 5 PAK	$429
INTEL ETHER 16 20 PAK	$1619
SMC ETHER + ELITE COAX	$115
SMC ETHER + ELITE COAX 6 PAK	$629
XIRCOM POCKET ADAP ADAPTER	$259
XIRCOM PCMCIA ETHER ADAPTER	$265
ZIRCOM POCKET ETHER PRINT SVR	$269

No charge for MasterCard or Visa. We will ship COD on a cash or cashier's check basis only. Shipping & handling 3% – $6 minimum; AK and HI slightly higher. 15% restocking charge on returned items. Purchase orders accepted from Fortune 1000, Government institutions, schools and universities. 2% shipping discount available on orders over $2000 if prepaid by check.

Prices and availability subject to change.

KENOSHA COMPUTER CENTER
2133 91st Street
Kenosha, Wisconsin 53143

KENOSHA COMPUTER CENTER

CIRCLE 242 ON READER SERVICE CARD

1-800-255-2989

Mon.-Fri. 8:00 a.m.-7:00 p.m. • Sat. 9:00 a.m.-3:00 p.m.

IT WAS WRITTEN AGES AGO

MidWest Micro
WOULD UNCOVER
TODAY'S GREAT DISCOVERIES.

RULE YOUR EMPIRE WITH MIDWEST MICRO

translated years later. Sure enough, in 1982, the MidWest Micro empire emerged. It brought precious discoveries and a new era of advancement to computer technology.

With 14 Computer Shopper Best Buy Awards and PC Computing's Five Star Rating for outstanding service and prices, MidWest Micro has already made history as the best source for computers and peripherals. We invite you to journey down the Nile with us and take home your own collection of treasures.

-Day Guarantee Carved In Stone

try an Elite System or Notebook for 30 days. t doesn't meet your needs send it back and we'll und your money. It's that simple.

time Toll-Free Technical Support

r System Consultants do more than answer questions; they to your needs, analyze the situation and then recommend a ion. You can depend on MidWest Micro's Technical Staff to keep your Elite up and running through even the most lt applications.

nteed To Satisfy Even The Most ding Pharaoh

eed a computer you can depend on—that's why Elite Systems are backed by our 3 year "Real Warranty". otebooks and SubNotes are backed by our one year . During that time we offer immediate parts replacement onents you can easily install. For internal repairs, simply ur system or notebook and we'll correct the problem hours. Our fast-turnaround times mean you'll never be ur Elite System for long.

Shipping—The Fastest own The Nile

weeks to get the system you want? Order from MidWest t your Elite System or Notebook fast. Most standard s are shipped within 24 hours. If you'd prefer a custom we'll do our best to have it out our door within

mpire With New Business Leasing Options

usiness leasing options from MidWest Micro your t the computer systems you need—today! Our ent plans are designed to meet your business' and free up capital for other important business ur MidWest Micro sales representative today for asing opportunities.

onument With Custom Configuration

or notebook the

...stories you've been loo... configuring a system, you ... one of our five new case de... representative for details.

Built For A King

We've created majestic ... our systems. Made for ... attractive cases have a s... both convenient and st... offer more expansion o... from our slimline, deskt... mid-tower and full-tower

It's No Secret

Did you know that when ... system from MidWest Micro ... or exchange one of your flop... a CD-ROM drive? It's easy. As... MidWest Micro representative for ...

Cleopatra Says: "Go Green!"

In an effort to be 100 percent energy efficient, MidWe... participates in the EPA's Energy Star Program. Only PC ... and printers that power down to less than 30 watts while ... recognized in the program. MidWest Micro is dedicated t... the environment and helping you save money on monthly ... bills. Call your MidWest Micro salesrepresentative to lear... about the Energy Star Program.

The Real Warranty

With some companies you get what you pay for. But when shopping with MidWest Micro, you always get more than you bargained for— Like The Real Warranty. Each Elite Desktop System comes backed by a full three year warranty. That means all internal components, as well as the monitor and hard drive, are covered. You see, only MidWest Micro has the confidence to back its systems with a warranty free from limitations or restrictions. Careful planning during the design and manufacturing stages ensures that Elite Systems meet or exceed today's high standards in terms of quality, compatibility and performance.

	Compaq	Dell	Expotech	Gateway 2000	MidWest Micro
The Real 3 Year Warranty	NO	NO	NO	NO	YES

Computer Shopper Best Buy 1990

energy star

PC Computing ★★★★★

MidWest Micro

Slimline Value Systems

486DX2-50 $1399

#006672

Treasures:

- Intel 486DX2-50 Processor
- 128K High-Speed Cache
- 4 Mb High-Speed RAM
- 260 Mb IDE Hard Drive
- 1.44 Mb 3.5" Floppy Drive
- 14" SVGA .28 Non-Interlace Color Monitor with Hitachi CRT
- Local Bus Graphics with 1 Mb
- 1 Parallel and 2 Serial Ports
- 101-Key Enhanced Keyboard
- High-Resolution, 3-Button Mouse
- Slimline Case
- *FREE* Microsoft DOS 6.2 *Installed*
- *FREE* Microsoft Windows for Workgroups 3.11 *Installed*

SIMPLE EXTERIORS CONCEAL INCREDIBLE POWER INSIDE

The Power Of Pentium

Don't expect a lazy trip down the Nile when you operate an Elite Pentium System. This blazing fast system features the newest source of computing power—Intel's 60MHz Pentium Processor! With nearly twice the on-chip cache, and double the raw throughput of a DX2-66 processor, Pentium technology is the find of the century!

Intel built the Pentium processor with a 64-bit path for data to travel on—that's two times the size of today's largest 32-bit local bus. Combine this bus with two 8K banks of cache and Elite Pentium Systems roar through all your software applications. Just how fast is the Pentium processor? Whether you're building a pyramid, deciphering heiroglyphics or exploring multimedia, your Pentium-based PC will run as fast as a workstation.

For unprecedented power and unparalleled success, choose a Pentium System from MidWest Micro. Then you'll have something that ancient Egyptians didn't...the power of a Pentium PC.

Elite PCI and Pentium Systems

486DX2-66 $2499

#006679

Treasures:

- Intel 486DX2-66 Processor
- 256K High-Speed Cache
- 8 Mb High-Speed RAM
- 545 Mb IDE Hard Drive
- 1.44 Mb 3.5" Floppy Drive
- Dual Speed Multimedia CD-ROM Drive
- 15" SVGA .28 Non-Interlaced Multi-Scan Color Monitor with Hitachi CRT
- Intel PCI Local Bus Graphics Card
- 1 Parallel and 2 Serial Ports
- 101-Key Enhanced Keyboard
- High-Resolution, 3-Button Mouse
- 8-Bay Middle Tower Case
- *FREE* Microsoft DOS 6.2 *Installed*
- *FREE* Microsoft Windows for Workgroups 3.11 *Installed*

P5-60 $2499

#006680

Treasures:

- Intel 60 MHz Pentium Processor
- 256K High-Speed Cache
- 8 Mb High-Speed RAM
- 450 Mb IDE Hard Drive
- 1.44 Mb 3.5" Floppy Drive
- 14" SVGA .28 Non-Interlaced Color Monitor with Hitachi CRT
- PCI Local Bus Graphics Card
- 1 Parallel and 2 Serial Ports
- 101-Key Enhanced Keyboard
- High-Resolution, 3-Button Mouse
- 8-Bay Middle Tower Case
- *FREE* Microsoft DOS 6.2 *Installed*
- *FREE* Microsoft Windows for Workgroups 3.11 *Installed*

P5-60 $2999

#006681

Treasures:

- Intel 60 MHz Pentium Processor
- 256K High-Speed Cache
- 8 Mb High-Speed RAM
- 545 Mb IDE Hard Drive
- 1.44 Mb 3.5" Floppy Drive
- Dual Speed Multimedia CD-ROM Drive
- 15" SVGA .28 Non-Interlaced Multi-Scan Color Monitor with Hitachi CRT
- Intel PCI Local Bus Graphics Card
- Internal 14.4 S/R Fax Modem
- 1 Parallel and 2 Serial Ports
- 101-Key Enhanced Keyboard
- High-Resolution, 3-Button Mouse
- 8-Bay Middle Tower Case
- *FREE* Microsoft DOS 6.2 *Installed*
- *FREE* Microsoft Windows for Workgroups 3.11 *Installed*

Seagate

Elite VESA System

486DX2-66 $1999

#006677

Built to last, Elite VESA Systems avoid bottlenecks by giving video cards first priority in using the processor. With a 32-bit link between the system processor and the video card, Elite Systems move video information at the speed of the processor (up to 66 MHz). That's an earth-shattering improvement over the 8 MHz bus speeds of ISA and EISA systems. For optimized video performance, choose the best—an Elite VESA Local Bus System.

Treasures:

- Intel 486DX2-66 Processor
- 128K High-Speed Cache
- 8 Mb High-Speed RAM
- 340 Mb IDE Hard Drive
- 1.44 Mb 3.5" Floppy Drive
- Dual Speed Multimedia CD-ROM Drive
- 15" SVGA .28 Non-Interlaced Multi-Scan Color Monitor with Hitachi CRT
- 32-Bit VESA Local Bus SVGA Video Card
- 32-Bit VESA Local Bus IDE Card
- 1 Parallel, 2 Serial & 1 Game Port
- 101-Key Enhanced Keyboard
- High-Resolution, 3-Button Mouse
- 8-Bay Mini-Tower Case
- FREE Microsoft DOS 6.2 *Installed*
- FREE Microsoft Windows for Workgroups 3.11 *Installed*

intel inside

MidWest Micro

6910 U.S. Route 36 East, Fletcher, Ohio 45326

1-800-682-7256

Fax:1-800-562-6622

Monday-Friday: 9 a.m. to 7 p.m. Saturday: 10 a.m. to 4 p.m.

VISA

For your protection we check thoroughly for stolen credit cards.

Dealers Call:

1-800-682-0522

Outside U.S. Call

1-513-368-2309

Customer Service & Technical Support Call:

1-800-243-0313

For your protection we check thoroughly for stolen credit cards. Prices and availability are subject to change. We are not responsible for errors in typography and photography. See policy statement for further details.

AD#G0301

MidWest Micro

Elite 486SX/DX Notebook

SL-Enhanced Processor
Up to 520 Mb HDD
PCMCIA Type III

A Dream Come True

Almost every ancient Egyptian dreamed of having a portable computer. Thanks to the 486SX/DX Notebooks, their dreams can come true for you.

These Elite Notebooks feature Intel's "SL-Enhanced" microprocessors, delivering excellent power management and a long battery life. The centerpiece of SL Technology is the System Management Mode (SMM), which allows your Notebook to slow down, suspend or completely shut down various components of your system.

The 486SX/DX Notebooks come with a divine gift—the gift of choice. Depending on your specific needs, choose from a 120, 200, 340 or 520 Mb hard drive, an upgradeable 486SX-25, DX-33, DX2-50 or DX2-66 processor. Also choose from a large 10" monochrome screen, active-matrix color screen, or the new 10.3" dual-scan color screen.

Elite's 486SX/DX Notebooks also feature the latest PCMCIA technology. They all have a PCMCIA Type III slot, which accepts two Type I cards, two Type II cards or one Type III card. Use these cards to add memory enhancements, network adapters, modems and more.

Buy the notebook ancient Egyptians only dreamed of—order your Elite 486SX/DX Notebook today.

	Monochrome		Dual-Scan Color		Active Matrix Color	
CPU	SX-25	DX-33	SX-25	DX2-66	DX2-50	DX2-66
Hard Drive	120 Mb	200 Mb	200 Mb	340 Mb	340 Mb	520 Mb
Price	#005501 **$1399**	#005517 **$1599**	#005579 **$1999**	#005580 **$2499**	#005581 **$3499**	#005582 **$3999**

Dual-Scan Color Notebooks include Windows.
Active Matrix Color Notebooks include Windows and an additional 4 Mb of RAM for a total of 8 Mb.

Treasures:

Processor:
Intel 486SX-25, 486DX-33, 486DX2-50 or 486DX2-66 SL-Enhanced upgradeable processor

RAM:
4 Mb, expands to 20 Mb

Hard Drive:
120 Mb, 200 Mb, 340 Mb or 520 Mb

Screen:
10" on Mono or Active units
10.3" on Dual Scan units
Backlit display
Color - 256 colors
Monochrome - 64 gray shades

Battery Life*:
Active Color - 3 hours
Dual-Scan Color - 4 hours
Monochrome - 6 hours

Weight:
Color - 6.9 lbs.
Monochrome - 6.4 lbs.

512K DRAM with turbo bus accelerated video technology

Simultaneous video on active-matrix color and monochrome units

86 keys with 101-key emulation

Built-in trackball

Built-in 1.44 Mb, 3.5" floppy drive

Advanced Power Management

One parallel and one serial port

External VGA and keyboard connectors

One PCMCIA Type III slot/ two Type II slots

FREE AC adapter and utilities disk

FREE MS-DOS 6.2 installed

FREE carrying case

Call for additional configurations and ask about our new second year extended warranty on all Notebooks and SubNotebooks.

Elite 486SX-25 SubNote

Ancient Egypt is known for great myths, historical treasures and powerful dynasties. You can discover another source of great power with Elite's 486SX-25 SubNote.

The 486SX-25 has the latest features, like Intel's "SL-Enhanced" processor, Advanced Power Management and PCMCIA technology.

It's a mystery how a little 3.9 lb. SubNote contains as much power as a desktop, but it does. The 486SX-25 comes with 4 Mb of RAM, expandable to 12 Mb, a fast 25 MHz processing speed and your choice of a 120, 200 or 340 Mb hard drive. It also delivers excellent 640 x 480 VGA resolution on its 10" high-contrast screen producing clear, concise images that even a mummy can easily see!

Elite's unforgettable SubNote symbolizes power, ground-breaking technology and true portability. Before you hop on your camel to start your next historical journey—call MidWest Micro and order the 486SX-25.

Treasures:

Processor:
Intel 486SX SL-Enhanced processor
Processing Speed:
25 MHz
RAM:
4 Mb expands, to 12 Mb
Hard Drive:
120 Mb, 200 Mb or 340 Mb
Screen:
10", 640 x 480 VGA resolution
Backlit display
64 gray shades
Battery Life*:
5 hours
Weight:
3.9 lbs.

512K DRAM with turbo bus accelerated video technology
Simultaneous video
83 keys with 101-key emulation
Built-in trackball
External 1.44 Mb, 3.5" floppy drive
Advanced Power Management
Nickel metal hydride battery
One parallel and one serial port
External VGA and keyboard connectors
One PCMCIA Type II slot
FREE AC adapter and utilities disk
FREE MS-DOS 6.2 installed
FREE carrying case

486SX-25 SubNote		
120 Mb	#005576	$1399
200 Mb	#005577	$1479
340 Mb	#005578	$1579

Elite 486SLC2-50 Color/Monochrome Notebook

Discover the riches of the land with your Elite 486SLC2-50 Notebook. This portable is perfect for long journeys due to its compact size and energy-saving SUSPEND/ RESUME feature. You can even compute up to six hours on a single charge!

Available in color or monochrome, the Elite comes with a fast 50 MHz processor, internal cache memory and up to 8 Mb of RAM—giving you more power for your money!

Both 486SLC2-50 models have a record of unparalleled success in eliminating distortion and eyestrain with their non-glare VGA screens. Images appear at up to 640 x 480 resolutions in 64 gray shades or 256 colors revealing eye-catching text, graphics and hieroglyphics.

Your Elite's LCD panel lets you know which drives are being accessed, when battery power is low, what function keys are enabled, whether external power is being used and if there is a modem ring. All the information you desire is right before your eyes!

The wait is over for both you and the Pharaohs. Your Elite Notebook is here—and it's just a toll-free phone call away.

Treasures:

Processor:
Cyrix 486SLC2-50
Processing Speed:
50 MHz
RAM:
2 Mb RAM, expands to 8 Mb
Hard Drive:
120 Mb or 200 Mb
Floppy Drive:
Built-in 1.44 Mb 3.5"
Screen:
Color - 9", 256 colors
Monochrome - 10", 64 gray shades
Video RAM:
512K
Keyboard:
83 key with 101-key emulation
2-button thumball mouse
Weight:
Color - 5.7 lbs. with battery
Monochrome - 5.4 lbs. with battery
Battery Life*:
Color - 4 hours
Monochrome - 6 hours

640 x 480 resolution
Simultaneous video
Local Bus Video
Advanced Power Management
One parallel and one serial interface
External VGA monitor and keyboard connectors
FREE AC adapter, carrying case and MS-DOS 6.2 installed
One year manufacturer's warranty

	120 Mb		200 Mb	
Color	#005476	$1639	#005477	$1699
Monochrome	#005482	$1259	#005483	$1329

*Battery life measured with Power Management enabled. Actual battery life may vary.

MidWest Micro
6910 U.S. Route 36 East, Fletcher, Ohio 45326
1-800-682-7256
Fax:1-800-562-6622
Monday-Friday: 9 a.m. to 7 p.m. Saturday: 10 a.m. to 4 p.m.

For your protection we check thoroughly for stolen credit cards.

Dealers Call:
1-800-682-0522
Outside U.S. Call:
1-513-368-2309
Customer Service & Technical Support Call:
1-800-243-0313

For your protection we check thoroughly for stolen credit cards. Prices and availability are subject to change. We are not responsible for errors in typography and photography. See policy statement for further details.

AD#G0303

CIRCLE 398 ON READER SERVICE CARD

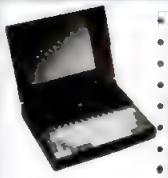
BEST PRICES IN TOWN • (800) 831-8808

CALL FOR UPDATED PRICES

DEE ONE SYSTEMS MONTHLY SPECIALS

SUPER SALE	MOTHERBOARD WITH CPU		BASIC SYSTEM +120MB HDD +14" MONO & HSP CARD	BASIC SYSTEM +120MB HDD +VGA CARD +VGA COLOR MONITOR	BASIC SYSTEM +120MB HDD +SVGA CARD +SVGA COLOR MONITOR	BASIC SYS W/ 4MB RAM 1.2 & 1.44 FDD +120MB HDD +SVGA CARD +SVGA COLOR MONITOR	BASIC SYS W/ 4MB RAM 1.2 & 1.44 FDD +200MB HDD +SVGA CARD +SVGA COLOR MONITOR	BASIC SYS W/ 4MB RAM 1.2 & 1.44 FDD +340MB HDD +SVGA CARD +SVGA COLOR MONITOR
	$258		$858	$788	$798	$958	$1,018	$1,088
	228		628	738	788	928	988	1,058
	456		858	888	868	1,158	1,218	1,288
	488		888	898	1,028	1,188	1,248	1,318
	348		748	858	888	1,048	1,108	1,178
	312		710	820	850	1,018	1,070	1,140
	158		588	678	708	868	928	998
	598		1,008	1,118	1,148	1,308	1,368	1,438
	628		1,038	1,148	1,178	1,338	1,398	1,468
	488		898	1,008	1,038	1,198	1,258	1,328
	488		888	1,008	1,038	1,188	1,258	1,328
	448		848	958	988	1,148	1,208	1,278
	478		878	988	1018	1,178	1,238	1,308
	348		748	858	888	1,048	1,108	1,178
	328		728	838	868	1,028	1,088	1,158
	318		700	810	848	1,000	1,060	1,130
	184		562	672	702	862	922	992
	132		532	642	672	832	892	962
	144		542	652	682	842	902	972
	102		502	612	642	802	862	932
	72		472	582	612	772	832	902
	66		466	576	606	766	826	896

BEST PRICES IN THE WORLD



- 4MB RAM INSTALLED
- 120MB HARD DRIVE
- 1.44 FLOPPY DRIVE
- 1 SERIAL / 1 PARALLEL
- BUILT-IN TRACKBALL
- BATTERY PACK
- CARRYING CASE
- MS DOS 6.2

Best Buy	VGA Mono	Dual Scan Color	Active Matrix Color
486SX-25	$1,335	$2,025	$2,795
486SX-33	1,395	2,085	2,845
486DX-33	1,485	2,175	2,995
486DX2-50	1,585	2,285	3,045
486DX2-66	1,685	2,385	3,215

OPTIONS

• Upgrade to 8MB RAM	Add $268
• Upgrade to 20MB RAM	Add $1,548
• 200MB Hard Drive	Add $128
• 340MB Hard Drive	Add $328
• Internal Battery Pak	Add $94
• Internal Fax Modem	Add $128
• Pocket Fax Modem	Add $118
• Docking Station	Add $368

*BASIC SYSTEM CONFIGURATION:

LOCAL BUS STOP

NEW HARD DRIVES

120mb 15ms (IDE)	$152
130mb 15ms / 170mb 17ms (IDE)	174 / 184
212mb 16ms / 250mb 14ms(IDE)	194 / 214
340mb 15ms / 540mb 12ms (IDE)	264 / 464
200mb 16ms (SCSI)	244
340mb 13ms (SCSI)	348
540mb 12ms (SCSI)	484
1.2GB 13ms (SCSI)	848
2.0GB 13ms (SCSI)	1,128

MATH COPROCESSORS

80287-10	$40
387SX-33 / 25	50 / 48
387DX-40 / 33	54 / 52

PRINTERS

Citizen GSX-190 (9-Pin)	$158
Citizen GSX-230 / 240 (24-Pin)	248 / 298
Citizen GSX-145 (24-Pin)	378
Color Option for Citizen Printer	46 / 66
Panasonic KX-P1150 / 2023	138 / 198
Panasonic KX-P2123 / 2124	218 / 316
Panasonic KX-P1624 / 2624	376 / 396

KEYBOARDS

101 Enhanced Keyboard (Mitsumi)	$16
Maxiswitch / Keytronics	28 / 30
MaxiPro II (124 Key Programmable)	54
Focus 2001 / 7000 (w/Tracball)	36 / 54
Focus 8000 (w/Calculator) / 9000	48 / 58
Omnikey 101NI / 102 / Ultra	68 / 68 / 98

VIDEO CARDS AND MONITORS

VGA-256K / 512K	$28 / 38
1MB SVGA Card (1024•768•256)	56
Windows Accelerators w/1MB	58
Trident / Cirrus Logic w/1MB (VLB)	76 / 76
Genoa 8500 VLB w/1MB	98
ATI Graphic Ultra w/Mouse	154
ATI Graphic Ultra Plus w/2MB	226
ATI Graphic Ultra Pro w/2MB	320
ATI Graphic Ultra Pro VLB w/2MB	324
Diamond Speed Star Pro VLB / ISA	106
Diamond Stealth 24VLB w/1MB	146
Diamond Viper VLB w/2MB	368
Orchid Fahrenheit 1280+ w/1MB	138
Orchid Fahrenheit VLB w/1MB	144
Orchid Celsius VLB. 1MB / 2MB	204 / 268
MAG 15F (15") / 17F (17")	494 / 870
Nanao F340iw / F550iw	544 / 1,098
Nanao T560i / T660i	1,656 / 2,398
NEC 3V / 4FGe / 5FGe	548 / 676 / 1,064
Sony 1430 / 1604 / 1730	548 / 928 / 974
Viewsonic 4E / 6E / 14E	264 / 284 / 344
Viewsonic 15E / 15	384 / 454
Viewsonic 17G / 17 / 20	844 / 964 / 1,544
Hitachi CM-2095 (20")	1,294
14" Mono / VGA Mono	80 / 100
14" VGA (640•480, 0.51)	170
14" Super VGA (1024•768, 0.39)	190
14" Super VGA (1024•768, 0.28)	220
14" Super VGA (1024•768, 0.28) NI	240
15" Super VGA (1280•1024, 0.28)	334
17" Super VGA (1280•1024, 0.28)	594

CD ROM / MULTIMEDIA

Creative Sound Blaster Pro Deluxe	110
Mediavision Pro Audio Spectrum 16	138
Mitsumi or SONY CD-ROM w/Card	140
Panasonic CD-562 Dbl Speed w/card	198
Chinon CDS535 (SCSI) Internal	324
Toshiba XM-3401B 200ms (SCSI)	338
Trantor (SCSI) Host with Driver	50
Creative Edutainment CD16 Upgrade Kit	466
Speakers System	10

HARD/FLOPPY DRIVE ADAPTERS

IDE 2FD/2HD Cache Controller (0K)	$88
Vesa Local Bus IDE	28
Adaptec SCSI 1542CF / 1542CFK	178 / 235
Adaptec SCSI 2742TK (EISA)	368
Bustek SCSI 445S (VLB)	275

MISCELLANEOUS

2400 Modem	28
Fax Modem (9600 Fax, 2400 Modem)	40
Fax Modem (14.400 Fax, 14,400 Modem)	112
US Robotics 14.400 FM Int / Ext	150 / 168
3-Button Mouse	9
Logitech Mouseman Serial / Bus	50 / 62
Microsoft Mouse Serial / Bus	36 / 58
Conner Tape Backup 250MB	130
Colorado Tape Backup DJ-10/20	96 / 160
Colorado Trakker JT-20 (250MB) Ext	338
16 Bit Ethernet Card Coax/10 Base T	44

VISA MasterCard

Dee One Systems

To Order Call

800-831-8808

- [redacted]
- [redacted]
- [redacted]
- [redacted]
- [redacted]
- [redacted]
- [redacted]

For Printers, It's Arlington!

Arlington's 10 Year Anniversary!

OKIDATA

Tank Tough®

OKILASER 400e

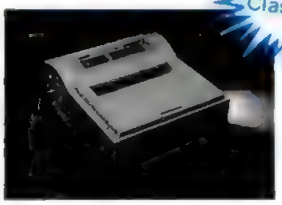
PC MAGAZINE EDITORS' CHOICE

$495.00

- 4 PPM
- 300 DPI
- 512K Ram
- RISC Processor
- Emulated HP IIP
- 44 Resident Fonts

OKILASER 410e

600 DPI Class Output



- HP III Compatible
- 2 MB Ram

$669.00

OL810-$899 OL830-$1089 OL850-$1189

MICROLINE 590

PC MAGAZINE EDITORS' CHOICE

- 24 Pin
- 360 CPS Draft
- 120 CPS L.Q
- 8 Fonts

ML320	$295	ML591	$569
ML321	$415	ML395	$959
ML380	$209	ML395C	$1029
ML520	$369	ML3410	$1199
ML521	$489	DocIt 3000	$2389
ML590	$415	DocIt 4000	$2699

Canon

BJ-600 — $579.00

Great Color All Around. Whether you're printing text, graphics, or even photographs, the BJC-600 will give you sharp and vivid 360 dpi color output.

- Perfect on plain paper.
- 20 Scalable Fonts.
- Color without going into the red. A separate ink cartridge for each color, so you don't have to replace all other colors when one runs out.

LBP-430 — $579.00 LBP-860 — Call
BJ-10SX - Portable — $239.00

BJ-200e

Introducing the new BJ-200e with improved enhancements to the BJ-200, which was the November 1993 PC Magazine's Editors' Choice.

- Up to 33% faster text throughput
- Dramatically improved graphics
- 20 true type fonts
- Reduction mode added

$285.00

BJ-230 - Wide Carriage — $389.00

Notebook 486-SL-120 MG — $1549.00
Notejet 486-135 MG — $2349.00
Notejet 486-85 MG — $2139.00
Notejet 486-180 MG — $2549.00

EPSON

FX870	$259	LQ1170	$589
FX1170	$345	LQ2550	$879
LQ570+	$235	DFX5000	$1299
LQ870	$425	DFX8000	$2189
LQ1070+	$355	Action 3250	$169
Action Laser 1000	$579		
Action Laser 1500	$639		
Action Laser 1500-2MG	$689		
Stylus 300	$239		
Stylus 800	$279		

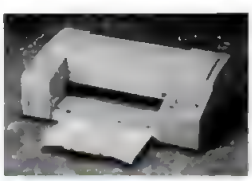
ACTION NOTE 486 SLC2-50

- 120 MG Drive
- 4 MG RAM
- Fax Modem

$1619.00

ACTION LASER 1500

- 6 PPM
- 27 Fonts
- PCL5 Compatible
- PC Computing - "Best PCL5"



STYLUS 800

- Inkjet at 360 DPI
- 7 Scalable Built-In Fonts

FOR ORDERS & QUOTES:

800-548-5105

Arlington Computer Products, inc.

For Value, It's Arlington!

COLORADO MEMORY SYSTEMS INC.

TRAKKER 250

Just plug it into a Parallel Port!

$315.00

JUMBO 250

$159

One of the top tape back-ups available at an incredible price!

Colorado Jumbo 120	$119	Colorado Trakker 250	$315
Colorado Jumbo 250	$159	Colorado 2GB Ext.	$1069
Colorado Trakker 120	$275	Qic 80 Tapes	$21

Hayes

Accura 14.4/Fax - Int.	$189
Accura 14.4/Fax - Ext.	$219
Hayes Optima 96	$309
Hayes Optima 96 Fax	$339
Hayes Optima 14.4/Fax	$369
Hayes 28.8	$425
Hayes Ultra 96 14.4	$589
Hayes Pocket 14.4	$299
PCMCIA 14.4	$269

PRACTICAL PERIPHERALS

Practical Per. 9600 Int.	$139
Practical Per. 9600 Ext.	$155
Practical Per. 14.4 Int.	$159
Practical Per. 14.4 Ext.	$169
Practical Per. 14.4 Ext. S/A	$359
Practical Per. 14.4 Pocket	$269
PCMCIA 14.4	$265

U.S. Robotics

14.4 Sportster External W/Fax

• V.42/MMP • 5 Year Warranty

Sportster 14.4 Int.	$145
Sportster 14.4 Ext.	$159
Sportster 14.4 Int. Fax	$149
Sportster 14.4 Ext. Fax	$169
Terbo 14.4 Dual Std. 16.8	$679
V.32 Terbo Fax	$379
V.32 Terbo Fax Int.	$345
PCMCIA 14.4	$279

CHIPS

1MB/4MB Simms	$49/$149
AST Memory	CALL
Compaq Memory	CALL
Epson Action 2 MG	$99
Cyrix DRx2-16/32	$255
Cyrix DRx2-20/40	$289
Cyrix DRx2-25/50	$365
HP 4MG Upgrade	$159
Intel 80387 SX	$75
Intel 80387 DX	$85
Kingston SX/Now 386-25	$169
Kingston SX/Now 386-33	$199
Kingston 486 Now-25 MHz	$389
OKI Laser 2MB	$125
Toshiba Memory	CALL

BATTERY BACK-UP

AMERICAN UPS

250	$99	1250	$485
400	$155	Smt 400	$279
450	$185	Smt 600	$335
600	$259	Smt 900	$529
900	$369	SM-1250	$679

TRIPPlite

BC250/400	$95/$145
BC400/500 Lan	$149/$185
BC600/750	$239/$299
Omni 500/600	$249/$295
Omni 750/1250 Lan	$395/$595

NETWORKING

Netware Lite	$69
Netware 3.12 5 User	$579
Netware 3.12 10 User	$1299
Netware 3.12 25 User	$1849
Netware 3.12 50 User	$2349
Netware 3.12 100 User	$3299
Netware 4.0 10 User	$1959
Netware 4.0 25 User	$2899
Lantastic Starter 5.0	$419
Node Runner 2000C	$169
Node 2000C 12-Pack	$1859
Node Runner SI 2000	$85
Node Runner SI 5-Pack	$425
T Runner 8-Port	$295
T Runner 12-Port T/P	$489
Central Station	$385
E143 Ethernet	$185
NE2000	$99
SMC Hub 8 Port T/P	$325
SMC Hub 8 Port Coax	$225
SMC TP 12 node Conc	$579
SMC+16-6 Pack	$619
SMC Ethercard +/+16	$89/$115
3 Com EtherLink II 16	$155
3 Com Etherlink III	$119
Etherlink III 5 Pack	$519
Intel Ether 16	$89
Intel Ether 16-5 Pack	$429
Intel Ether Flash 5-Pack	$499
Intel Ether 16-20 Pack	$1629
Intel Ether EISA 32	$509
Intel Token 16/S	$389
Thomas Conrad 5143 Coax	$119
TC 5143 Coax 6-Pack	$679
TC 5143-10 BT	$95
TC 5143-10 BT 6 BK	$479
TCNS 100 Mbps	$435
Xircom Pocket Ethernet	$269
Xircom PCMCIA Ethernet	$279

HEWLETT-PACKARD

Laserjet IV w/Toner	$1369
Laserjet IVP w/Toner	$989
Laserjet IVMP w/Toner	$1379
Laserjet IVL w/Toner	$675
Laserjet IVML/w/Toner	$1039
Laserjet IVM w/Toner	$1929
Laserjet IV SI w/Toner	$2989
Laserjet IV SI MX	$4499
HP IV Toner	$99
Jet Direct 2371A	$399
Jet Direct 2371B	$449
1MG Upgrade	$69
2MG Upgrade	$99
4MG Upgrade	$159
8MG Upgrade	$339
Deskjet 256K	$69
Deskjet 310	$299
Deskjet 500/500C	$309/409
Deskjet 550C	$489
Deskjet 1200C	$1369
Deskjet 1200C/PS	$1939
2P Scanner	$719
IIC Scanner	$979
Pacific Page/XL	$259/$699
Pacific Data 25 in 1 Font	$239

TEXAS INST.

486/WINSX 120	$1835
486/WINSX 25 Color	$2119
486/DX2/50-200 MG	$2639
486/DX2/40 Color	$2889
486/DX2/50E Color	$3749
MicroWriter Basic	$519
MicroWriter PS23	$675
MicroWriter PS65	$935
Pro 600 PS23	$1329

LEXMARK

Laser Printer 6	$929
Laser Printer 10	$1109
Laser 4039 10R	$1329
Laser 4039 12R	$1679
Inkjet 4076	$279
2380+/2381+	$305/$435

AST NOTEBOOKS

170MB Mono/Color	$1869/$2525
170 MG Color+	$3295
Power Exec 200 MG	$2399
Power Exec 200 MG-Active	$3939

SOFTWARE

Aldus Pagemaker 5.0	$519
Corel Draw 4.0	$359
Corel Draw 4.0 Upgrd	$209
D Base IV	$409
Harvard Graphics	$245
Lotus 123 2.4/3.4	$279/$325
Lotus 123 4.0	$279
Lotus Smart Suite	$399
Microsoft Access 1.1	$295
Microsoft Office	$449
Microsoft Word	$289
Microsoft Windows 3.1	$69
Microsoft DOS 6.0 Upg.	$59
Norton 7.0	$109
Q&A	$175
QEMM	$65
Word Perfect 6.0	$249
Word Perfect Windows	$269
Win Fax Pro	$75
Word Perfect 6.0 Upgrd	$99

Panasonic Office Automation OA

1124I	$229	2624	$369
2023	$199	3123	$279
2123	$229	4410	$535
2124	$295	4430	$639
2180	$169	4440	$999
1624	$379	4455	$1659

4410/4450I 2 MG...$129

NEC

Jetmate 1000	$269
P6200/P6300	$399/$599
P9300	$825
Superscript 610	$635
Model 95/95FX	$869/$1079
Model 1097	$1349

SCAN. & DIGIT.

Calcomp 12 × 12-4	$299
Calcomp 12 × 18-16	$399
Epson Scanning 600	$779
Epson Scanning 800	$999
Epson Professional	$1199
Logitech ScanMan 256	$169
Color ScanMan	$409
ScanMan w/Omni Page	$185
Summasketch 12×12	$269
Summasketch 12×18	$499

Arlington Computer Products, inc.

FOR ORDERS & QUOTES:

800-548-5105

intel Modems

Along with connecting you to an audience of millions, Intel Fax Modems provides outstanding value.

Fax Modems

24/96 Int.	$59.00	96/96 Int.	$139.00	14.4/14.4 Int.	$145.00
24/96 Ext.	$119.00	96/96 Ext.	$159.00	14.4/14.4 Ext.	$165.00

SatisFAXtion MODEMS

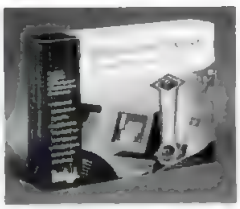
200 2400 V.42/9600 Fax	$199.00	400 14.4/14.4 Fax	$259.00
300 14.4/9600 Fax	$219.00	400 Ext. 14.4/9600Fax	$295.00

PC MCIA MODEMS

Take your office with you wherever you go. The Intel PCMCIA Fax-modem is a credit card-sized adapter that inserts into a computer's PCMCIA slot

24/96	$179.00
14.4/14.4	$269.00

intel OverDrive Processors



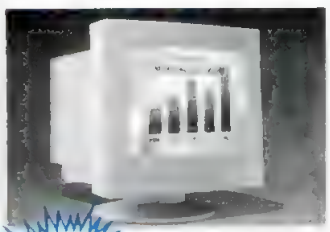
The Intel OverDrive Processor for Intel 486 SX and Intel 486 DX CPU-based systems integrates an integer unit, a floating point unit, a memory management unit and an 8K cache on one chip that operates at an internal speed twice that of the system bus

This unique feature allows users to double the frequency of their present microprocessors. For example, the OverDrive Processor doubles the internal operating speeds of a 25-MHz Intel 486 SX CPU-based system to 50 MHz

- Powerful, single chip performance, booster for systems based on any standard Intel 486 microprocessor
- Improves overall system performance by up to 70%
- Accelerates both integer and math performance

DX-25 - $295.00 **SX-20 - $279.00**
DX-33 - $475.00 **SX-25 - $295.00**

MONITORS



FLAT SCREENS

NEC

3 FGE/3 V	$579/499
4 FGE	$679
5 FG/5 FGP	$1245/1319
5 FGE	$1049
6 FGP	$2289

CTX

5468A/1451	$249/$279
1560/1760	$379/$699

MAG

LX1450 14"	$309
MX15F 15"	$495
MX17F 17"	$879

MITSUBISHI

EGA-1430C	$279
Diamond Pro 17	$999
Diamond Scan 15 FS	$479
Diamond Pro 21 FS	$2149
HL6955 20"	$1759

NANAO

F340IW	$689
F550I/F550IW	$995/$1089
T560I/F560IW	$1649/$1339
F760IW	$2029

SONY

CPD-1604S	$939
CPD-1730 17"	$999
GDM 2036S	$1999

VIEW SONIC

15/17-7	$429/$789
17	$949
20/21	$1529/$1789

DRIVES & TAPES

Back Pack 250	$339
Back Pack 200 MG Drive	$429
Connor 250 Tape	$149
Connor 120/170	$179/$199
Connor 212/540	$239/$639
Teac Dual Floppy	$119
Toshiba 3½" 1.44	$69

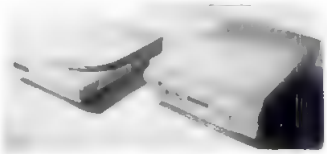
QUANTUM

LPS 270	$259
540-IDE/SCSI	$555/$585
PD-1050/SCSI	$919

SEAGATE HARD DISKS

40 MB for AT (ST251-1)	$229
130 MG 3145A	$189
245 MG 3283	$279
260 MG 3290A	$225
341 MG 3390A	$299
452 MG 3550A	$409
535 MG SCSI 3610N	$609
2100 MG SCSI 12400N	$1949

CD ROM



NEC - TRIPLE SPEED

NEC 3Xe	$549
NEC 3Xi	$439
NEC 3Xp	$419
NEC 4X Pro	$899
Fusion Double CD	$499
Soundblaster 16 SCSI 2	$179
Pioneer 6 Disc Quadro	$1339

VIDEO BOARDS

ATI Graph Ultra + 2MG	$229
ATI Graph Prof 2 MG	$329
Diamond Stealth Pro	$239
Diamond Viper 2 MG	$389
Hercules Dynamite VLB	$155
Hercules Graphite 2MG	$369
1024 VGA 16 Bit	$59

ARLINGTON COMPUTER PRODUCTS... GREAT SERVICE SINCE 1984!

- **PC Magazine "...Arlington offers worry-free mail order purchasing!"**
- **PC Sources Review "...You can be confident that what you order will work!"**
- **PC Computing "...Courteous service and terrific technical support!"**
- **PC Computing Mail Order Review of Peripheral Specialists 8/93. We received the only 5 Star Rating for Price!**

Prices and availability subject to change without notice. Qualified purchase orders accepted.

CIRCLE 336 ON READER SERVICE CARD

Hours C.S.T.
7:30-8:30 pm Mon-Fri
9:00-5:00 pm Saturday

1970 Carboy.
Mt. Prospect, IL 60056

NO SURCHARGE FOR CHARGE CARDS!

CUSTOMER SERVICE AND IN ILLINOIS
708-228-6333
SHIPPING
708-228-9748
TECHNICAL ASSISTANCE
708-228-1470
FAX
708-228-0516

Arlington Computer Products, inc.

FOR ORDERS & QUOTES:

800-548-5105

CIRCLE 336 ON READER SERVICE CARD

LIGHTNING

In Windows-shattering competition, Comtrade's EISA Professional Machine stood head & shoulders above 191 others to win the coveted PC Magazine's Editors Choice award for Best Windows Workstation, December 7, 1993. This is the fifth time in recent months that lightning has struck at the same place – Comtrade. This same Comtrade system also won PC World '94 Best Buy, Computer Shopper's Top Ten Best Buy, PC Sources Best Buy and Computer Buyer's Guide & Handbook Best Buy. Call Comtrade at 1.800.969.2123 and find out how you too can have the lightning speed and quality of a Comtrade System.

intel inside

EISA / PCI Professional

- Hottest 486 EISA or Pentium PCI System
- 256K Ultra Fast Cache SRAM
- 16MB RAM & Expandable to 128MB
- One Floppy Drive (3.5" or 5.25")
- Local Bus IDE HD Controller
- 530MB 10ms IDE Drive with 256K Cache
- VL-Bus/PCI Diamond Stealth 32 Graphics Accelerator with 2MB (Up to 1280x1024 & up to 16.7 million Colors) **(Up to 25 Million Winmark 4.0)**
- 15" Flat Screen .28mm Non-interlaced Color Monitor **(Low Radiation, 36% larger edge to edge display)**
- 2 Serial, 1 Parallel & 1 Game Ports
- Enhanced 101-key Keyboard
- Hi-Resolution 400 DPI Serial Mouse
- Anti-Virus MS-DOS 6.2 & Windows 3.11
- Three-Year System & Lifetime Labor Warranty

486/66 DX2	$2525
P5/60 *PCI*	$3145
P5/66 *PCI*	$3495

- Double Speed CD-ROM Drive Add $220
- 17" Flat Screen 1280x1024 Monitor Add $370

EISA / PCI WinMax

- Hottest 486 EISA or Pentium PCI System
- 128K Ultra Fast Cache SRAM
- 8MB RAM & Expandable to 128MB
- Multi-Session CD-ROM (Double Speed) Drive
- One Floppy Drive (3.5" or 5.25")
- 32 Bit VL-Bus / PCI IDE Hard Disk Controller
- 425MB 12ms IDE Drive with 128K Cache
- VL-Bus/PCI ThunderPro Graphics Accelerator with 1MB RAM (Up to 1280x1024 & up to 16.7 million Colors)
- 15" Flat Screen .28mm Non-interlaced Color Monitor **(Low Radiation, 36% larger edge to edge display)**
- 2 Serial, 1 Parallel & 1 Game Ports
- Enhanced 101-key Keyboard
- Hi-Resolution 400 DPI Serial Mouse
- Anti-Virus MS-DOS 6.2 & Windows 3.11
- Three Year System & Lifetime Labor Warranty

486/66 DX2	$2125
P5/60 *PCI*	$2795
P5/66 *PCI*	$3145

- Diamond 16 Sonic Sound Card Add $125
- 14,400 Baud FaxModem & Fax Software Add $130

STRIKES!

PC MAGAZINE EDITORS' CHOICE

December 7, 1993 ™
Comtrade EISA VL-Bus Professional

VESA Local Bus WinXpress

- OverDrive Socket for **Pentium™** P24T Technology
- 128K Cache SRAM & Expandable to 256K
- **4MB** RAM & Expandable to 64MB
- One Floppy Drive (3.5" or 5.25")
- VESA Local Bus IDE Hard Disk Controller
- **340MB** 12ms IDE Drive with 64K Cache
- 32-Bit VL-Bus **ThunderPro** Graphics Accelerator with MB RAM Up to 1280x1024 & up to 16.7 million Colors
- 4 Non-interlaced .28mm 1024x768 Color Monitor (2% larger **edge to edge** display)
- 9600/2400 Baud **FaxModem** with Fax Software
- 2 Serial, 1 Parallel & 1 Game Ports
- Enhanced 101-key Keyboard
- Hi-Resolution 400 DPI Serial Mouse
- Anti-Virus MS-DOS 6.2 & Windows 3.11
- Three-Year System & Lifetime Labor Warranty

486/33 DX	$1525
486/50 DX2	$1555
486/66 DX2	$1655

- Multi-Session **CD-ROM** Drive Add $180
- 15" Flat Screen & Low Radiation Monitor Add $100

VESA Local Bus Best Buy

- OverDrive Socket for **Pentium™** P24T Technology
- 128K Cache SRAM & Expandable to 256K
- **8MB** RAM & Expandable to 64MB
- One Floppy Drive (3.5" or 5.25")
- VESA Local Bus IDE Hard Disk Controller
- **425MB** 12ms IDE Drive with 128K Cache
- 32-Bit VL-Bus **ThunderPro** Graphics Accelerator with 1MB RAM (Up to 1280x1024 & up to 16.7 million Colors **(Up to 38 Million Winmark 3.11)**
- 15" Flat Screen .28mm Non-interlaced Color Monitor **(Low Radiation, 36% larger edge to edge display)**
- 2 Serial, 1 Parallel & 1 Game Ports
- Enhanced 101-key Keyboard
- Hi-Resolution 400 DPI Serial Mouse
- Anti-Virus MS-DOS 6.2 & Windows 3.11
- Three-Year System & Lifetime Labor Warranty

486/33 DX	$1765
486/66 DX2	$1895
P5/60 *PCI*	$2575

- Diamond Stealth 32 Accelerator (2MB) Add $150
- 17" Flat Screen 1280x1024 Monitor Add $370

1.800.969.2123

International 818.961.6688
Fax 818.369.1479
Tech Support 800.899.4508
24-Hour BBS Service 818.961.6098
Hours: 7:00-7:00 Pacific Mon-Fri
9:00-6:00 Pacific Sat

15314 East Valley Boulevard
City of Industry, California 91746

COMTRADE

"Where Quality is Everything"

CIRCLE 316 ON READER SERVICE CARD

MIDWEST COMPUTER WORKS

WELCOME

YOUR MAIL ORDER SUPERSTORE !

NETWORKING HARDWARE

Get the ... Best PRICES, SERVICE & SELECTION!!!

You are our top priority. If you're not happy, we're not happy. That's why we have taken a vow to provide you with the best prices, service and selection possible. If you don't see your product listed call us, we'll get it! If our prices aren't the lowest, we'll beat it!

- **Widest Selection** Choose from a huge inventory of thousands of items, all in-stock and ready for immediate shipment.
- **Knowledgeable Sales Staff** All of our personnel are technically trained to provide you with the right solutions.
- **On-Time Delivery** All in-stock orders are shipped the same day. We're fast and efficient.
- **Just ask our Customers** We earn your business everyday. That's why over 70% of our business is repeat customers.
- **Quality Products** All of our products are name brands and factory fresh, providing the highest quality possible.
- **Comprehensive Tech Support** We just don't sell you, we service you ! Our technicians are standing by to help with any problems that might arise.

Fast Shipping, no problem ! We deliver when you need it.

DHL UPS Worldwide Air Freight Services FEDERAL EXPRESS NEXT DAY AIR 2ND DAY AIR

We make it easy with flexible payment methods!

- Purchase orders accepted from educational institutions, federal & state agencies and approved corporations.
- All major credit cards accepted.
- C.O.D's welcome.

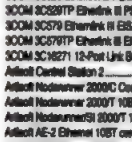
Policy Information

• Your credit card is not charged until the merchandise is shipped • Personal and company checks will delay orders 2 weeks • No extra charge for credit cards • All prices subject to change • For orders outside the USA we require payment by wire transfer or American Express credit card • We check for stolen credit cards • All returns for credit, repair or exchange must have a return authorization number issued by our customer service department • All returned merchandise must be shipped to our main warehouse located at: 140 Lexington Drive, Buffalo Grove, IL 60089

ORDER DEPARTMENT
1-800-859-6757
FAX Line 1-708-459-6933
International line 1-708-459-6884
Customer Service 1-708-459-9410
Technical Support 1-708-459-9411

NETWORKING

3COM 3C603 Ethernlink II 16-bit coax 169
3COM 3C603TP Ethernlink II 16-bit 10baseT 139
3COM 3C509 Ethernlink III coax 119
3COM 3C509 Ethernlink III coax 5-pack 519
3COM 3C509TP Ethernlink III 10baseT 119
3COM 3C509TP Ethernlink III 10baseT 5-pack 525
3COM 3C509 Combo Ethernlink III coax & 10baseT 139
3COM 3C529 Ethernlink III PS/2 coax 227
3COM 3C529TP Ethernlink III PS/2 10baseT 227
3COM 3C579 Ethernlink III EISA coax 229
3COM 3C579TP Ethernlink III EISA 10BaseT 239
3COM 3C16271 12-Port Unit Builder 10baseT 819
Adtech Control Station 2 299
Adtech Nodeserver 2000/C Coax 175
Adtech Nodeserver 2000/T 10BT 175
Adtech NodeserverSI 2000/T 10BT 69
Adtech AE-2 Ethernet 10BT card 109
Adtech AE-2 Ethernet 16-bit coax card 149
Adtech AE-3 Ethernet Combo card 192
Adtech AE-2 V5.0 Starter kit for DOS 449
Adtech AE-2 V5.0 Starter kit for Windows 519
Adtech AI 8-user / 10-user / 50-user ..... CALL
Adtech Pwr Hub internal 10base-T 395



DigiBoard
High Speed Communication Adapters
Tired of your operating system bottlenecking by the limited performance of standard COM1 and COM2 serial ports combined with the CPU resources required to manage serial I/O traffic? DigiBoard sets the standard for high-speed Windows communications and remote LAN access.

DigiBoard ..... ALL MODELS ..... CALL
IBM Token Ring adapter II 399
IBM Token Ring adapter II 16/4 495
Intel Ether Express 16-bit coax 99
Intel Ether Express EISA 32-bit coax 449
Intel Token Express 16/4 ISA 399
Netware 2.2 5-user/10-user 499/999
Netware 3.12 5-user 549
Netware 3.12 10-user 1349
Netware 3.12 25-user 1849
Netware 3.12 50-user 3495
Netware 3.12 100-user 3499
Netware 3.12 250-user 5799
Netware 5PT @ 3.11 ..... BEST PRICE ..... CALL
Netware V4.01 5-user / 10-user CDROM 899/1049
Netware V4.01 25-user CDROM 2599
Netware V4.01 50-user CDROM 3995
Netware V4.01 100-user CDROM 5999
Netware V4.01 250-user CDROM ..... CALL
Netware V4.01 500-user CDROM ..... CALL
Netware V4.01 1000-user CDROM ..... CALL
Netware 3.12 on CDROM or diskette ..... CALL
Netware Upgrades Available ..... BEST PRICE
Netware Lite software 99
Netware Lite Starter kit NE2000 319
NE1000 Ethernet 8-bit coax 97
NE2000+ Ethernet 16-bit coax 109
SMC Arcnet PC130PC270E 69/109
SMC Arcnet PC600WS workstation 119
SMC Arcnet PC600FS server 169
SMC Arcnet 8-port Coax Active Hub 225
SMC Ethercard+ Elite 8-bit coax 94
SMC Ethercard+ Elite 16-bit coax 119
SMC Ethercard+ Elite 16T 16-bit 10baseT 119
SMC Ethernet 8-port 10BaseT Concentrator 329
SMC Ethernet 12-port 10BaseT Concentrator 699
SMC Elite 16 Ultra Ethernet coax 99
SMC Elite 16T Ultra Ethernet 10baseT 99
SMC Elite 16C Ultra Ethernet Combo 119
SMC Ethercard+ Elite 16-bit PS/2 10baseT 194
SMC Ethercard+ Elite 16-bit Combo 194
SMC Ethercard+ Elite 32-bit EISA coax 299
SMC Ethercard+ Elite 32-bit EISA 10baseT 399
Thomas Conrad 6242 Arcnet 8-bit 89
Thomas Conrad 6045 Arcnet 16-bit 179
Thomas Conrad 3045 STP 100 mbps 449
Thomas Conrad 3045-CX 100mbps coax 437
Thomas Conrad 3046ST 100mbps fiber 764
Thomas Conrad 3047 CX 100mbps EISA 599
Thomas Conrad 3050 STP 8-port Hub 1195
Tiara 0196 Arcnet 8/16-bit TP/coax 115
Tiara 0129 Ethernet E2000 8/16-bit coax 99
Xircom Pocket Arcnet coax 299
Xircom Pocket Arcnet twisted pair 324
Xircom Pocket Ethernet coax 399
Xircom Pocket Ethernet 10baseT 399
Xircom Pocket Token Ring Adapter 699
Xircom Pocket Ethernet Print Server coax 399
Xircom Pocket Ethernet Print Server 10baseT 399
Xircom Parallel Port Multiplexor 79
Xircom Credit Card Enet 16-bit coax or 10baseT 269

VIDEO BOARDS

ATI VGA Integra 1024x768 512k 89
ATI VGA Wonder GT 1MB 169
ATI Graphics Ultra+ 2MB ISA 235
ATI Graphics Ultra Pro 2MB ISA 349
ATI Graphics Ultra Pro 2MB EISA 374
ATI Ultra Pro VLB 2MB 349
Boca Super-X 1MB ISA / 2MB VESA 109/199
Boca Vortex VRAM 2MB 239
Diamond Speedstar Pro 1MB 109
Diamond Stealth Pro 1MB/2MB 239/339
Diamond Stealth Pro Local Bus 1MB/2MB/4MB/32M 299/399/599/3295
Diamond Viper Local Bus 1280X1024mi 395
Hercules Dynamite Pro ISA or VLB 1MB 159
Hercules Graphite Pro 1MB / 2MB 249/374
Matrox MGA-Ultra 2MB ISA 619
Matrox MGA-Ultra 2MB VEBA 649
Number Nine GXE VLB Level 11 / 12 ..... 359/429
Number Nine GX3 TC Level 20 1449

DIGITIZERS

Calcomp 12x12 / 12x18 all w/16 button 279/539
Kurta 12x12 XLP / 12x18 XLP 229/469
Summagraph III 12x12 / 12x18 Pro 319/529
Wacom ArtZ 6x8 / 6x9 ..... 329/449

PLOTTERS

Calcomp Designmate 3024S 1749
Hewlett Packard Plotters ..... ALL MODELS
Houston Instruments DMP52 C/D 1-pen 1699
Houston Instruments DMP61 A/D 1-pen 2139
Pacific Data Pro Tracer II 1349
Roland DXY-1180 A/B 8-pen magneto 899
Roland DXY-1250 A/B 8-pen electrostatic 1099

COLORADO MEMORY SYSTEMS INC.
Jumbo 250 Internal Tape Backup System
America's number 1 selling tape drive.It's affordable with a back-up speed of 9.3MB per minute. Includes powerful Colorado Backup software. Holds up to 250MB using data compression. For IBM and PC compatibles. Model DJ-20 ..... $169.00

TAPE BACKUP

Colorado DJ-10 120MB / DJ-20 250MB 99/165
Colorado Trakker 120MB / 250MB 279/327
Colorado FT-05 2GB SCSI w/controller int 949
Conner Tapestor 250MB Internal 149/299
Conner Mayneteam 2.0gig DAT ext 1299
Conner Mayneteam 4.0gig DAT ext 1419

MICROTEK ScanMaker II SP
This single pass flatbed scanner captures your originals in 24-bit color, 8-bit grayscale or single-bit black & white at resolutions up to 1200x1200 dpi! Comes with Adobe Photoshop LE & DCR (Dynamic Color Rendition) software packages. For only $749.00

SCANNERS

Epson 600C Color / 800C Color 779/1099
Hewlett Packard Scanjet 2P grayscale 703
Hewlett Packard Scanjet 3CX Color 999
Logitech Scanman 256 169
Microtek Scanmaker II G w/OmniScan bdle 402
Microtek Scanmaker II XE otf w/Photoshop LE 899
Microtek II SP color w/ Adobe Photoshop LE 749
Microtek II HR High Resolution color ..... NEW
Mustek Color Hand Scanner 400dpi w/soft 239

MODEMS

Boca Pocket Modem 14.4 w/Fax 179
Boca Modem 14.4 w/Fax w/Fax Int 179
Boca Modem 14.4 w/Fax ext 199
Hayes Acura 144+ FAX/SCEZ Int 199
Hayes Optima 14.4 + FAX14.4 EZ ext 369
Intel Satisfaction 100 / 200 ..... 89/219
Intel Satisfaction 300 / 400e 229/319
Megahertz modems for all laptops ..... CALL
Multitech 1432MU 14.4 fax/modem pocket 379
Multitech 1432EA 14.4 fax/modem ext 429
Practical Periph 2400EFX w/Fax & other Int 99
Practical Periph PM1440FX Pocket 399
Practical Periph 14,400 send/rec fax ext 219
Supra 14.4 S/R Fax Internal 139/199
Supra Fax Modem 14.4LC ext 159
Telebit QBlazer v.32 v.42 v.42bis Intnpt All Models
UDS Internal & external...ALL MODELS ..... CALL
US Robotics Sportster 2400 w/fax ext 119
US Robotics Sportster 14.4 Internal 149/199
US Robotics Sportster 14.4 w/fax ext 199/249
Courier V32 Turbo 19.2 w/fax int / ext 399/599
US Robotics Worldport pocket modems ..... CALL
Zoom VFP 19.2 Fast int w/fax 149
Zoom VFP24K Fast ext w/fax 175
Zoom VXV32BIS 14.4 v32/32bis/42bis ext 144

MF-6317
Accurately calibrate color! Idek's Vision-Master™ System gives you absolute control. This 17" monitor has a .28mm DK glass for glare treatment, 30-65 kHz, 50-90 Hz, 120 MHz, and 1280x1024 resolution. $675

MONITORS

ADI MicroScan 2E 14" 800x600 ni .28mm 299
ADI MicroScan 3E / 3Es+ 14" 1024x768 ni .28mm..309/349
ADI MicroScan 3G 14" 1280x1024 ni .28mm..349
ADI MicroScan 4G 15" 1280x1024 ni .28mm..429
ADI MicroScan 5A 17" 1280x1024 ni .25mm..825
Amdek mono VGA 14"..... 129
CTX 14" 1024X768 .28mm..... 249
CTX 14" 1024x768 ni .28mm..... 299
CTX 15" 1024x768 ni .28mm..... 365
CTX 15" 1024x768 ni .28 digital..... 379
CTX 17" 1024x768 ni .28 digital..... 699
Goldstar 1423+ 14" 640x480 .51mm..... 199
Goldstar 1460+ 14" 1024x768 .28mm..... 249
Idek MF-5315 15" 1024x768 ni .28mm..... 469
Idek MF-6217 17" 1280x1024 ni .28mm..... 679
Idek MF-6317 17" 1280x1024 ni .28mm..... 949
Idek MF-6221 21" 1600x1200 ni .28mm..... 2099
Idek MF-8421 21" 1600x1200 ni .28mm..... 2139
Idek MF-8621 21" 1600x1200ni .28mm..... 2529
MAG MX15F 15" 1280x1024 .28mm..... 517
MAG MX17F 17" 1280x1024 .28mm..... 899
Mag MX17FG 17" 1280x1024 .28mm..... 959
Mitsubishi Diamond Scan 17" 1280x1024..... 999
Mitsubishi Diamond Scan 20" 1024x768..... 1549
Nanao F340W 15" 1024x768 .28mm..... 599
Nanao F550I 17" 1280x1024 .28mm..... 899*
Nanao F550W 17" 1280x1024 .28mm..... 1149*
Nanao T560I 17" 1280x1024 .28mm..... 1639*
Nanao T660I 21" 1280x1024 .31mm..... 2399*
NEC 3FGE / 3V 15" 1024x768 .28mm..... 599/699
NEC 4FGE 15" 1024x768 .28mm..... 699
NEC 5FGE / 5FGP 17" 1280x1024 .28mm..... 1049/1349
NEC 5FG 17" 1280x1024 .28mm..... 1945
NEC 6FG/ 6FGE 21" 1600x1200 .28mm..... 2249/CALL
Panasonic C-1381I 14" 1024x768..... 325
Philips 15" 1024x768 ni .28mm..... 419
Philips 1720DC 1600x1200 ni..... 999
Sony CPD1430 14" 1024x768 .25mm..... 499
Sony CPD1730 17" 1024x768 .25mm..... 999
Sony GDM-1781E1 17" 1600x1280 ni..... 1149
Sony GDM 2036 1600x1200 20" .30mm..... 2199
ViewSonic V15E 15" 1024x768 .28mm..... 379
ViewSonic V7 17" 1280x1024 ni .28mm..... 829

MATH CO-PROCESSORS

Cyrix 386 to 486 ..... CALL
Cyrix 80387SX-16/20/25 68
Cyrix 80387DX-16/20/25/33 69
Intel 486SX 16/20 to 40 Overdrive 299
Intel 486SX 2 486DX 20 to 40 Overdrive 500
Intel 486SX 2 486DX 33 to 40 Overdrive 499
Intel 80387SL / 80387SX 16/20/25 ..... 75/75
Intel 80387DX-20/25/33 79

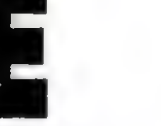
BATTERY BACKUPS

American Power BK250B / BK400B 97/157
American Power BK450 / BK600 ..... 169/229
American Power BK900 / BK1250 ..... 349/469
American Power AP400 SmartUPS 299
American Power AP600 SmartUPS 349
American Power AP900 SmartUPS 542
American Power AP900L SmartUPS 1049
American Power AP1250 SmartUPS 675
American Power AP2000 SmartUPS 1139
American Power SurgeArrest 17
American Power SurgeArrest Plus 28
American Power SurgeArrest Plus w/Tel 40
American Power Line-R 600 119
American Power Line-R 1250 169
Tripp Lite BC250 / BC400 ..... 99/149
Tripp Lite BC600 / 900 LAN 179/199
Tripp Lite BC600 LAN / 750 LAN 345/299
Tripp Lite BC900 LAN / 1250 LAN 349/449
Tripp Lite Omni 500 LAN / 600 LAN 259/299
Tripp Lite Omni 750 LAN / 1250 LAN 329/599
Tripp Lite ISO BAR 4 / ISO BAR 6 ..... 44/59
Tripp Lite Command Console 6 69
Tripp Lite Command Console 6 w/RJ11 79
Tripp Lite LC1200 / LC1800 ..... 149/197

MICE

Logitech Dexxa 3-button serial 79
Trackman II Combo 89
Logitech Cyberman 77
Logitech Mouseman 79
Logitech Trackman Portable 85
Microsoft bus or serial 400 dpi 79
Microsoft Ballpoint mouse 109
Microsoft Ballpoint mouse w/Windows 3.1 149

*Wizard user rebate. Ends 3/31/94

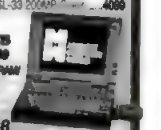


TEXAS INSTRUMENTS TM4000E
Win9X/25 Color
- Intel 486SX 25MHz
- 4MB-RAM Max-8MB
- 120MB hard drive
- 8.2" bright passive color display

$2129

NOTEBOOK COMPUTERS

AST Bravo NB486SX25 170MB Mono 1639
AST Bravo NB486SX25 170MB STN Color 2499
AST Bravo NB486SX25 170MB Active Clr 3229
AST PowerExec 486SL25 200MB ..... CALL
AST PowerExec 486SL25 200MB Color ..... CALL
Canon NoteJet 486/25MHz 130MB 2339
Canon NoteJet 486/25MHz 180MB 2539
Canon NoteJet 486 Color ..... CALL
Compaq Contura 4/25 120MB 1749
Compaq Contura 4/25 209MB 2099
Compaq Contura 4/25C 120MB Color 3619
Compaq Contura 4/25C 209MB Color 3969
Compaq LTE-LITE 25E 94MB Windows 1699
Compaq Concerto 4/25 / 4/33 ..... CALL
Texas Instr 486/25WinSX 120MB 1845
Texas Instr 486/25WinSX 120MB Color 2129
Texas Instr 486/25WinDX 120MB 1999
Texas Instr 486DX/25 200MB 2199
Texas Instr 486DX/250 120MB 3569
Texas Instr 486DX/250 200MB 3699
Texas Instr 486DX/250 200MB Color 3795
Texas Instr 486DX2/40, 200MB Color 5949
Texas Instr 486DX/250 455MB Active Clr ..... CALL
Toshiba T1950 486SDX/240 Mono 120MB 1899
Toshiba T1950 CS 8in Color 200MB 2995
Toshiba T1950 CT TFT Color 200MB 3999
Toshiba T4900C 486SL-33 Color 120MB 3879
Toshiba T4900C 486SL-33 200MB Color 4099



TEXAS INSTRUMENTS TM5400E DX2/50
- 486DX2 50MHz 4MB RAM Max. 20 MB-RAM
- 200MB hard drive
- 8.4" VGA Active or Display

$3798

COMPUTERS

AST Bravo LC 486SX-25 120MB 4MB 899
AST Premmia SE 486DX33 210MB 8MB 2339
AST Premmia MTE 486DX2/66 420MB 8MB 2739
Compaq Prolinea 4/25S 120MB 999
Compaq Prolinea 4/25S 240MB 1099
Compaq Prolinea 466/33S 120MB 1099
Compaq Prolinea 466/50 240MB 1699
Compaq Prolinea 4/66D 340MB 1899
Compaq Prolinea MT Mini-Towers...All Models ..... CALL
Compaq Prosignia 486DX2/66 model EL/1 2579
DTK Computer...custom configurations ..... CALL
Wyse Terminals 30+/50/60/325E3 278/369/278/539

DRIVES

Conner CP30084E 84MB 17ms IDE 169
Conner CP30104H 120MB 17ms IDE 189
Conner CP30174E 170MB 17ms IDE 199
Conner CP30204 212MB 12ms 219
Conner CP30344 343MB 12ms IDE 309
Conner CP3504 510MB 12ms IDE 479
Iomega Transportable Pro 90 ext 475
Iomega Multidisk 150 PC Powered Ext 549
Maxtor 7131A 130MB 15ms IDE 179
Maxtor 7213A 213MB 15ms IDE 215
Maxtor 7346A 340MB 15ms IDE 299
Micropolis 2205 504MB 10ms SCSI-2 729
Micropolis 2210 1.05GB 10ms SCSI-2 959
Micropolis 2217 1.7GB 10ms SCSI-2 1279
Quantum Pro-127AT 127MB 17ms IDE 189
Quantum Pro-240AT 240MB 16ms IDE 345
Seagate ST3144A 130MB 16ms IDE 189
Seagate ST3243A 214MB 16ms IDE 219
Seagate ST3290A 280MB 16ms IDE 339
Seagate ST3390A 341MB 12ms IDE 599
Seagate ST3550A 452MB 12ms IDE 399
Seagate ST3655A 545MB 12ms IDE 529
SyDos 85I 85MB internal removable 379
SyDos 85E 85MB external removable 449
SyDos Puma 85MB ext/parallel removable 439
Trac FD505 dual floppy drive 119
Trac 3.5" and 5.25" disk drives 59
Toshiba 3.5" 1.44MB disk drive 59

CONTROLLERS

Adaptec AHA-1522A SCSI-2 ISA Kit w/Flop 139
Adaptec AHA-1542 SCSI-2 ISA w/Flop 199
Adaptec AHA-2742 SCSI-2 EISA w/Flop 399
Adaptec AHA-2842 SCSI-2 VESA w/Flop 299
Boca IDE 2-HDD, 2-FDD 16x8bit 35
Boca IDE 2-HDD, 2-FDD 2-ser, 1-par 49
Ultrastor 24F EISA SCSI 399
Ultrastor 34F VESA Local Bus SCSI-2 299

CALL FOR FREE CATALOG!

Call "THE WORKS" Today

PCMAG MAR 15, '94

TO THE WORKS!

A Commitment to Selection, Quality Service & Lowest Pricing

MULTIMEDIA

MULTIMEDIA

Creative Labs Digital Edge int.....
Creative Labs Discovery 8 Int.....369
Creative Labs Discovery 16 Int..439
Creative Labs Omni CD Int.....
Creative Labs Omni CD ext.....449

CREATIVE
CREATIVE LABS INC

EDUTAINMENT CD 16
Creative Labs Digitalerge Int. bundle .....
Creative Labs Edutainment16 Int. 409
MediaVision Fusion CD16 Int. 399
MediaVision Fusion Double LX Int. ....
MediaVision Fusion Double CD16 Int. 515
MediaVision Pro16 Multimedia II.....579
MediaVision Pro 16 Multimedia III.....779
MediaVision Pro16 CD-Internal .639
MediaVision Memphis ext CD-ROM Kit...679
Sony CDU33 A/N Starter Kit Int.....269
Sony CDU33 A/L Mltmdia Kit Int.....449
Sony CDU7305-3A Mltmdia Kit ext..539
Tevel Home Bundle w/8 CDs.....465
Tevel External Drive/Kit.....679
Tevel Multimedia Bundle Int.....789
Turtle Beach Multisound upgrd1249

VIDEO CAPTURE

Cardinal SnapPlus .....
Creative Labs Video Blaster SE 229
Creative Labs Video Spigot 249
Hauppauge WinTV-01 no/tuner 399
Hauppauge WinTV-02V w/tuner 419
MediaVision ProMovie Studio 329
TrueVision Video VGA4 / VGA16 .....
TrueVision Targa+ 16 / 64.....1195/1699
Visionix Desktop TV 179
Willow VGA TV 4000.....359
Willow Laptop TV 719
Sigma Reel Magic SCSI 409
Sigma Reel Magic VGA 369

PC SPEAKERS

Altec Lansing ACS100 Pair 125
Altec Lansing ACS200 Pair 199
Altec Lansing ACS300 System269
Creative Labs CT-38 25
Sony Powered Speakers .....CALL

CD-ROM DRIVES

Creative Labs Omni CD Int.....299
Hitachi CDR8700 369
NEC CDR-400 portable 3XP ...439
NEC CDR-600 internal 3XI.....479
NEC CDR-600 external 3XE ...569
Sony CDU-33A01 int dbl speed...185
Sony CDU-561 295ms SCSI Int.....299
Sony CDU7811 295ms SCSI ext...399
Texel 295ms bare drive 299
Toshiba TXM-3401-B Int.....369
Toshiba TXM-3401-E1 ext.....439

CD-ROM SOFTWARE

Corel Draw 4.0 349
Kings Quest VI 45
Leisure Suit Larry 5 39
Microsoft Office V4.0.....499
Microsoft Office Pro.....509
Microsoft Dinosaurs 49
Microsoft Golf V1.0.....45
NEC Type Gallery 235
Virgin 7th Guest.....49

OPTICAL DRIVES

Panasonic LF5014 WORM....2049
Panasonic LF3004 3.5"128mb 999
Panasonic LF7014A 1010 5.25" Int.2419
Pinnacle Tahoe 130PC 128MB ...1119
Pinnacle PMO120AT 3.5" 130mb/1719
Pinnacle PMO650i 5.25" 650mb ...2079
PU Infinity Floptical 3.5" 21mb Int..319
PU Infinity 3.5" 128mb Int 1249
Sony 3.5" 128mb rewrite ext...1299
Sony 5.25" 650MB rewrite Int.1929
Sony 5.25" 650mb rewrite ext.....2219
Valuestor Super 21MB Floptical ext..299
Valuestor Super 21MB Floptical port.429

SOUND BOARDS

ATI Stereo F/X-CD.....109
ASP Upgrd for Sound Blaster 59
Logitech SoundMan 16.....105
MediaVision Pro Audio Spectrum 16 Basic ...89
MediaVision ProAudio Studio16.159
MediaVision ProAudio Spectrum 16.....159
Sigma Winstorm.....165
Sound Blaster Deluxe.....79
Sound Blaster Pro Deluxe 115
Sound Blaster 16 MCD 169
Sound Blaster 16 ASP MCD....195
Sound Blaster 16 SCSI 2.....179
Sound Blaster 16 SCSI 2 ASP ...215
Sound Blaster MIDI Kit.....59
Wave Blaster Daughter Brd. 179
Turtle Beach Multisound 429
Turtle Beach Multi-bundle 689

PRINTERS

CANON

BJ108X.....239
BJ200E / BJ230 .....299/369
BJC-600.....579
BJC800 / BJC820 .....1468/1598
LBP430 / LBP8SX 569/869

CITIZEN

Notebook Printer II.....309

COMPAQ

Pagemarq 15 2599
Pagemarq 20 3749

EPSON

FX870 / FX1170.....267/365
LQ570+ / LQ870.....245/444
LQ1070 / LQ1170 .....365/611
LQ2550.....896
DFX5000 / DFX8000 .....1327/2269
Action 1000 / Action 1500...598/649
Action 2250 / Action 3250..119/174
Stylus800.....279

HEWLETT PACKARD

HP Portable 395
Deskjet 310.....316
Deskjet 500 / 500C 299/399
Deskjet 550C 479
Deskjet 1200C 1378
Laserjet 4L / 4P 674/998
Laserjet 4 1365
Laserjet 4M .....CALL
Laserjet 4Si 2978
Laserjet 4SiMX 4479
Paintjet XL300 2258

HP ACCESSORIES

Paper Case trays .....IN-STOCK
Pacific Data memory .....CALL
Toner for all models .....CALL

IBM

Execjet II 4078.....279
Jetprinter PS4079.....2499
Laser 6E 655
Laser 10 / Laser 10R 1119/1339
Lsr. 10R Duplex / Lsr.12R 1849/1884
Laser 12L / Laser 16L 2369/2809

NEC

P3200 / P3300.....225/322
Jetmate 1000.....269
P6200 / P6300.....399/599
Superscript 610.....575
Superscript 640.....785
Silentwriter 1097.....1419

OKIDATA

OL405e
This 300x300 DPI laser printer grows as your needs grow! With high speed RISC processor, 17 bitmapped fonts, 512K upgradable to 2.5MB of RAM, 100 page bottom paper feeder, and a print speed of 4 pages per minute! Introductory offer!.....$499

OKIDATA

184 Turbo.....219
320 / 321 .....299/419
520 / 521 .....369/499
590+ / 591+.....419/599
395 / 395c 959/1029
Laser 400E / 810.....499/699
Pacemark 3410.....1199
OL410e .....NEW

PANASONIC

KXP2180 / KXP2624 .....175/189
KXP2123 239
KXP2124 / KXP1624 .....319/369
KXP1654 / KXP2624.....599/399
KXP4410 / KXP4430 Laser 549/579
KXP4440 Laser 1029
KXP5400 Laser 839
KXP5410 Postscript Laser 1219

QMS

410 / 420 Postscript 1449/1199
860 Hammerhead 3989
860+ Hammerhead 5249
Colorscript 210 / 230 ....4499/7199
Colorscript 1000 Clr Lsr ...In-Stock
PS1725 4499

SEIKO

Smart Label Printer+ DOS/Win ..139
Smart Label Printer Pro.....239
CH-4104PSE Color Pstscrpt....2449

STAR

NX1040R / NX2430.....159/239
Starjet 48+.....295

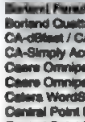
TEXAS INSTR

MicroMarc inkjet 300cps 277
MicroWriter Basic 5ppm.....517
MicroWriter PS23 5ppm.....699
MicroWriter PS65 5ppm.....936
Microlaser Pro PS23 8ppm 600dpi 1329*
Microlaser Pro PS65 8ppm 600dpi 1519
*$60 rebate Ends 3/94

SOFTWARE

WIN SOFTWARE

ACT! v1.0 for Windows 249
Adobe Illustrator 4.0 419
Adobe Photoshop 2.5 589
Aldus Freehand 3.1 369
Aldus Pagemaker 5.0 540
AutoCAD Lite 000
Borland C++ 3.1 / Turbo C++ 3.1 .....
Borland Office for Windows .....
Borland Paradox for Win V4.5 .....
Borland Quattro Pro V5.0 47
CA-dBfast / CA-Realizer 174/71
CA-Simply Accounting 65
Casey Omnipage Direct 179
Casey Omnipage Pro 2.1 .....
Casey WordScan Plus 2.0 .....
Central Point Backup 7.2 .....
Central Point PCTools Win 119
Corel Draw 4.0 375
Corel SCSI Software 79
Corel SCSI Pro V2.0 317
Crosstalk Bundle w/Crossfax Win ...129
Delrina Perform Pro + 1.0 .....
Delrina Winfax Pro 3.0 77



DesignCAD 2D for Windows! PC
Within minutes, you can turn your ideas into precise designs! DesignCAD comes complete with: 800 symbols, dimensioning, drafting and editing toolboxes, materials list, scaling, zoom, layers, & support of 7 file formats. DOS version also available. $195

Harvard Draw 1.0 189
Harvard Graphics 3.0 255
Lotus 1-2-3 ver 4.01 299
Lotus Ami Pro 3.01 235
Lotus Freelance 2.0.....339
Lotus SmartSuite 2.1 439
Microsoft Excel 4.0 295
Microsoft FoxPro 2.5 299
Microsoft Office 4.0.....469
Microsoft Project 3.0.....429
Microsoft Publisher V2.0.....113
Microsoft Win. NT Adv. Serv. ..949
Microsoft Win. NT V3.1 299
Microsoft Word 6.0 299
Norton Backup 3.0.....95
Norton Desktop 3.0.....115
PFS: Window Works 2.0.....75
Procomm Plus 1.02 95
Publisher's Paintbrush 2.0.....299
Quark Express v3.1 549
Quicken 3.0 39
Superbase 4 2.0 329
Word Perfect 6.0 286

DOS SOFTWARE

ACT! 2.1 for DOS.....248
CA-BPI Integrated.....147
CA-Clipper V5.2 Upgrade 199
CA-Simply Accounting 65
Borland Applause II 1.5.....309
Borland dBase IV 2.0.....519
Borland Framework IV 1.0 459
Borland Multimate 4.0.....239
Borland Paradox 4.5 519
Borland Quattro Pro 5.0 42
Central Point Anti-Virus 1.0.....65
Central Point Backup 5.0 59
Central Point PC Pro 9.0.....59
DAC Easy Accounting 4.4.....99
DAC Easy Bonus 4.4 145
Design CAD 3D 4.0.....395
Generic CADD 6.1 395
Harvard Graphics 3.0.....369
Lotus 1-2-3 2.4 325
Lotus 1-2-3 3.4 369
Lotus Symphony V3.0.....495
Microsoft C/C++ Compiler 7.0309
Microsoft Foxbase Plus 2.10..239
Microsoft FoxPro 2.5.....299
Microsoft Project 4.0 299
Multimate 4.0 239
Norton Backup 2.2 84
Norton Desktop 1.0.....113
Norton Utilities 7.0.....112
PC Anywhere 4.5 Host/Rem ..114
Peachtree Complete V7.0.....179
Procomm Plus 2.01.....69
Professional File 2.0 199
Professional Write 2.2.....159
Q & A 4.0 245
QuickBook with QuickPay 119
Quicken 7.0.....41
R:Base 4.5 469
Stacker 3.1 80
Timeslips 5.0.....179

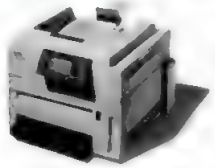
WordPerfect SIX.0

for Windows
It gives you the power and flexibility to create the documents you want, the way you want. You'll complete your tasks using fewer steps and less time because WPWin adapts to your style of working. Only $299

Word Perfect Add'l License.....169
Word Perfect Office.....
Wordstar 7.0 259
Xtree Gold 3.0.....91

MATCH OF THE CENTURY!

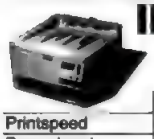
IBM vs. HP



	4039-10R	Laserjet 4
Printspeed	10ppm	8ppm
PostScript	YES	(Optional)
Resolution	600DPI	600DPI
Upgradable Language	YES	NO
Available Duplex Option	YES	NO
MCW Price	$1339	$1368

And the Winner is The 4039-10R from IBM!

IBM vs. HP



	4037-5E	Laserjet 4L
Printspeed	5ppm	4ppm
Paper Input	150 sht.	100 sht.
Optnl. 2nd Drwr.	YES	NO
Fonts	40	26
MCW Price	$655	$674

And the Winner is The 4037-5E from IBM!

IBM vs. HP

	Execjet II 4078	Deskjet 500
Paper Capacity	150 Sht.	100 Sht.
Resolution	600x300	300x300
Cart. Life	1000 pgs.	500 pgs.
Print Speed	300 cps	240 cps
Res. Enhancement	YES	NO
MCW Price	$279	$309

And the Winner is The Execjet from IBM!

IBM LEXMARK

GREAT PRINTER DEALS!

NEW

Canon PRINTERS!!!

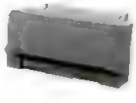
BJC-600 Bubble Jet Color Printer

- 360 dpi resolution
- 170 cps at 10 cpi; 340 cps at 20 cpi
- 150 sheet feeder
- Ltr, Lgl, Commercial #10

$585

The Canon BJC-600 is the brilliant choice in a personal color printer. That's because it can produce vibrant, high resolution color and laser-quality, true black output on low-cost plain paper. This makes the BJC-600 both an effective and efficient color printer for the home or small office.

BJ-200E Bubble Jet Printer



- 360 dpi resolution
- 173 cps-LQ mode
- 100 sheet feeder
- 8-1/2"x14" paper size

$289

InkJet printer that acts like a laser (except quieter AND lots cheaper)! At 4 pages-per-minute, this printer is fast. Plus, it requires less service and is more reliable because it integrates a straight paper path and uses a printhead instead of an ink cartridge. You can't beat going with this printer!

TEXAS INSTRUMENTS

SPECIALS • SPECIALS • SPECIALS • SPECIALS

microWriter Page Printers

From $519

3 Models: Basic, PS23, PS65

- Three models to choose from, including PostScript and HP LJII emulations (auto emulation switching on PS23 & PS65 models)
- Laser-quality, high resolution (300 dpi) printing
- Small footprint for true desktop use
- Compatible w/Windows, DOS & MAC
- Outstanding warranty • Fast 5ppm print speed

microLaser Pro 600 Printers

$1329* PS23

600DPI

2 Models: PS23, PS65

- Razor-sharp 600 dpi printing
- 500-sheet standard paper capacity
- Compatible w/Windows, DOS & MAC
- Easy-to-replace, long-lasting consumables
- Fast 8 ppm print speed w/RISC processor
- Built-in PostScript Level 2 software from Adobe & PCL
- 5 language (auto emulation on PS23 & PS65 models)

*With $60 rebate from Texas Instruments. Ends 3/94.

MIDWEST COMPUTER WORKS
180 Lexington Drive, Buffalo Grove, IL 60089

CALL FOR FREE CATALOG!

DIRECT ORDER LINE

1-800-85-WORKS

FAX 1-708-459-6933
Customer Service 1-708-459-9410

(1-800-859-6757)

CIRCLE 010 ON READER SERVICE CARD

PDMAG MAR 15, '94

HIT THE TRAIL WITH A WINNER.

TravelMate 4000E WinSX™/25 COLOR

$2,049
TEXTMS25CE

Lease as low as $100/Mo.

- 486SX 25MHz CPU
- 640 x 480 VGA 8.2" Color Display
- 256 Colors Simultaneously
- Pre-installed Windows 3.1™ and MS DOS®
- 4MB RAM, expandable to 20MB
- 120MB Hard Disk Drive
- MS BallPoint® with QuickPort™ Connection

TravelMate 4000E WinDX2™/50 Dual Scan COLOR

$3,219
TEXTMD25ØD

Lease as low as $151/Mo.

- 486DX2 50MHz CPU
- Dual Scan Color Display
- Pre-installed Windows 3.1™ and MS DOS®
- 4MB RAM, expandable to 20MB
- 200MB Hard Disk Drive
- MS Ball Point® with QuickPort™ Connection

TravelMate 4000E WinDX2™/50 COLOR

$3,699
TEXTMD25ØC

Lease as low as $165/Mo.

- 486DX2 50MHz CPU
- 8.4" Active Matrix Display
- Pre-installed Windows 3.1™ and MS DOS®
- 4MB RAM, expandable to 20MB
- 200MB Hard Disk Drive
- MS Ball Point® with QuickPort™ Connection

TravelMate 4000E WinDX2™/40 COLOR

- 486DX2 40MHz CPU
- 640 x 480 VGA 9.4" Color Display
- 256 Colors Simultaneously
- Pre-installed Windows 3.1™ and MS DOS
- 4MB RAM, expandable to 20MB
- 200MB Hard Disk Drive
- MS BallPoint® with QuickPort™ Connection

$2,679
TEXTMD24OE

Lease as low as $130/Mo

"It's a quality desktop replacement...most powerful portable we've seen. One of the lightest units in the entire test group."
PC Magazine, March '93

"...in our battery tests, the TI 4000 WinDX2/50 achieved a magnificent 6 hours and 24 minutes."
Portable Computing, April/May '93

"TI has done more to customize and optimize Windows than the other notebook vendors."
Windows Magazine, February '93

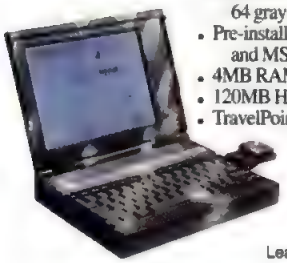
TravelMate 4000E WinDX2™/50

- 486DX2 50MHz CPU
- 640 x 480 VGA 10" Display, 64 gray scales
- Pre-installed Windows 3.1™ and MS DOS
- 4MB RAM, expandable to 20MB
- 200MB Hard Disk Drive
- MS BallPoint® with QuickPort™ Connection

$2,649
TEXTMD25OE
Lease as low as $129/Mo

TravelMate 4000E WinSX™/25

- 486SX 25MHz Processor
- 640 x 480 VGA 10" Display, 64 gray scales
- Pre-installed Windows 3.1™ and MS DOS®
- 4MB RAM, expandable to 20MB
- 120MB Hard Disk Drive
- TravelPoint™ pointing device



$1,699
TEXTMS25E
Lease as low as $82/Mo.

Insight

800-927-3175

TravelMate DeskTop Intelligent Docking System

NEW

- Auto load and eject
- Six 16-bit ISA card slots and four drive bays
- Two PCMCIA Type III card slots
- Desktop or tower configuration
- Windows for Workgroup upgrade incl.
- Designed for all TravelMates with QuickPort™ connection

$779
TEXTDOCKST

TravelMate, BatteryPro, WinSX, WinDX and TravelPoint are trademarks of Texas Instruments Inc. MS-DOS and BallPoint are registered trademarks, and Windows, Advanced Power Management and QuickPort are trademarks of Microsoft Corp. Lease figures based on 24-month F.M.V lease and include freight. Sales tax not included. Leases are non-cancelable and may require a deposit. Worry-Free Guarantee may have some restrictions for notebooks. Shipping is non-refundable.

SIMPLY THE LOWEST PRICES

EXPERTS' Windows PICK

Winner of *Windows Sources* Expert's Pick *Windows Sources* May 1993

"Expandable system, fast disk -- a Good Buy"
Windows Sources June 1993

PENTIUM!™ POWER

PCI P60 CD

Intel 60MHz PENTIUM™ Processor
New PCI interface motherboard
2 PCI, 4 ISA, 1 PCI/ISA Slots
16MB RAM, 256K Cache
540MB 12ms HDD w/cache
PCI IDE HDD Controller
15" NI SVGA Monitor
1.44MB 3.5" Floppy Drive
1 Bi-directional Parallel, 2 Serial ports
Enhanced 101 Key Kbd. - Mouse
MS-DOS 6.2, Windows for Workgroups
Ultimate Tower Case w/13 drive bays
New 273-pin socket for future Pentium™ powered upgrades

PLUS: 320ms, double-speed, CD-ROM drive with Toolworks MM Encyclopedia, Adventures, Fractals and National Parks Guide MPC CD's

Insight PCI P60 CD
$3,599
Lease as low as $161/mo

Insight VESA® Local Bus™ Computers

Insight 486 VL

Fully Upgradable Intel 80486 CPU
2 VESA VL-Bus™ Compatible Slots
4MB RAM - 128K Cache
340MB 12ms IDE Hard Drive
32 Bit VL-Bus™ Compatible IDE Controller
32 Bit VL-Bus™ Compatible 1MB Graphics Accelerator Super VGA Card
15" Non-Interlaced SVGA Color Monitor
1.44MB 3.5" Floppy Drive
2 Serial Ports, 1 Parallel Port
Enhanced 101 Key Keyboard - Mouse
MS-DOS 6.2 - Windows 3.1
Desktop Case standard, Full Tower or Mid-Tower Available

33MHz-486DX Insight 486 VL
$1,699
Lease as low as $83/mo.

50MHz 486DX2.....$1,759
66MHz 486DX2.....$1,859

486DX2-66 VL CD

Fully Upgradable Intel 80486 CPU
Two VESA® VL-Bus™ Compatible Slots
4MB RAM - 128K Cache
340MB 12ms Hard Drive
32 Bit VL-Bus™ Compatible IDe Controller
32 Bit VL-Bus™ Compatible 1MB Graphics Accel. SVGA Card
15" N I Super VGA Color Monitor
1.44MB 3.5" Floppy Drives
2 Serial & 1 Parallel Port
Enhanced 101 Key Keyboard- Mouse
MS-DOS 6.2 - Windows 3.1
Desktop Case, Full Tower, or Mid-tower Available
PLUS: CD-ROM Drive with 320ms, 340KB/sec., CD-Software including Adventures, Fractals and National Parks MPC

66MHz-486DX2 VL CD
$2,079
Lease as low as $101/mo.

intel inside

Upgrade your system:

Add a multimedia kit for $399
Includes drive, sound board, stereo speaker set, headphones and FREE CD software.
ODTA15ØØMK

Add an internal tape backup for only $179

Talon 250MB with data compression, includes two FREE tapes.

Upgrade from a 15" to a 17" Monitor for only $399
1280 x 1024 resolution, non-interlaced, .28mm dot pitch. MPR II certified.

The Intel Inside and Pentium Processor logos are trademarks of Intel Corporation. Lease figures based on 24-month T.M.V. lease and include freight. Sales tax not included. Leases are non-cancelable and may require a deposit.

HARD DRIVES IN ALL CAPACITIES.

40MB to 170MB

Capacity	Access	Form Factor	Brand	Interface	Model	Drive Kit
42MB	28ms	3.5" 1"H	Seagate	IDE	ST351A	$139
130MB	14ms	3.5" 1"H	Maxtor	IDE	MX7131A	189
130MB	15ms	3.5" 1"H	Seagate	IDE	ST3145A	189
170MB	14ms	3.5" 1"H	Quantum	IDE/SCSI	QULPS17ØA/S	199
170MB	17ms	3.5" 1"H	Conner	IDE	CP3Ø174A	199
170MB	12ms	2.5"	Western Digital	IDE	WDAL217Ø	319

200MB to 340MB

Capacity	Access	Form Factor	Brand	Interface	Model	Drive Kit
210MB	12ms	3.5" 1"H	Western Digital	IDE	WD121ØA	209
210MB	14ms	3.5" 1"H	Seagate	IDE	ST3243A	209
245MB	15ms	3.5" 1"H	Maxtor	IDE/SCSI	MX7245A/S	219/249
250MB	12ms	3.5" 1"H	Western Digital	IDE	WD225ØA	219
250MB	12ms	3.5" 1"H	Conner	IDE	CP3Ø254	229
260MB	16ms	3.5" 1"H	Seagate	IDE	ST329ØA	229
270MB	12ms	3.5" 1"H	Quantum	IDE/SCSI	QULPS27ØA/S	249
270MB	12ms	3.5" 1"H	Western Digital	IDE	WD127ØA	229
340MB	12ms	3.5" 1"H	Western Digital	IDE	WD234ØA	279
340MB	15ms	3.5" 1"H	Maxtor	IDE/SCSI	MX7345A/S	299/349
340MB	13ms	3.5" 1"H	Conner	IDE/SCSI	CP3Ø344/Ø	289/299
340MB	12ms	3.5" 1"H	Seagate	IDE/SCSI	ST339ØA/N	299/379
340MB	12ms	3.5" 1"H	Quantum	IDE/SCSI	QULPS34ØA/S	299

420MB to 700MB

Capacity	Access	Form Factor	Brand	Interface	Model	Drive Kit
420MB	12ms	3.5" 1"H	Western Digital	IDE	WD242ØA	369
452MB	12ms	3.5" 1"H	Seagate	IDE/SCSI	ST355ØA/N	409/539
520MB	12ms	3.5" 1"H	Fujitsu	IDE/SCSI	FJ2624A/S	529
540MB	12ms	3.5" 1"H	Western Digital	IDE	WD254ØA	429
540MB	12ms	3.5" HH	Seagate	IDE/SCSI	ST3655A/N	559/599
540MB	9ms	3.5" 1"H	Maxtor	IDE/SCSI	MX54ØA/S	719/759
540MB	12ms	3.5" 1"H	Quantum	IDE/SCSI	QULPS54ØA/S	569
545MB	10ms	3.5" 1"H	Conner	IDE/SCSI	CP3Ø544/Ø	579/649

1 GIG to 1.9 GIG

Capacity	Access	Form Factor	Brand	Interface	Model	Drive Kit
1050MB	10ms	3.5" HH	Micropolis	IDE/SCSI	MC221ØA/S	829/839
1050MB	12ms	3.5" HH	Toshiba	SCSI	MK537FBS	999
1050MB	9.5ms	3.5" 1"H	Seagate	SCSI	ST312ØØN	939
1070MB	10ms	3.5" 1"H	Digital	SCSI	DE31Ø7S	999
1080MB	10ms	3.5" HH	Fujitsu	SCSI	FJ2694S	849
1080MB	9ms	3.5" 1"H	Quantum	SCSI	QUEM1Ø8ØS	859
1225MB	10ms	3.5" HH	Quantum	SCSI	QUPD1225S	949
1260MB	12ms	3.5" HH	Toshiba	SCSI	MK538S	969
1337MB	9.5ms	3.5" 1"H	Digital	SCSI	DE3133S	1,199
1600MB	9ms	3.5" HH	Seagate	IDE/SCSI	ST11900N	1,249
1600MB	9.5ms	3.5" HH	Digital	SCSI	DE316ØS	1,299
1700MB	8ms	3.5" HH	Seagate	SCSI	ST1195ØN - Barracuda	1,649
1750MB	10ms	3.5" HH	Micropolis	IDE	MC2217A	1,099
1750MB	11ms	5.25" FH	Fujitsu	SCSI	FJ2652S	1,299
1750MB	10ms	3.5" HH	Micropolis	SCSI	MC2217S	1,099
1800MB	10ms	3.5" HH	Quantum	SCSI	QUPD18ØØS	1,189
1900MB	12.9ms	5.25" FH	Seagate	SCSI	ST421ØØN	1,479

2 GIG and up!

Capacity	Access	Form Factor	Brand	Interface	Model	Drive Kit
2060MB	11ms	5.25" FH	Fujitsu	SCSI	FJ2654S	1,299
2100MB	9.7ms	3.5" HH	Digital	SCSI	DE321ØS	1,699
2100MB	11ms	5.25" FH	Micropolis	SCSI	MC1926	1,499
2100MB	10.5ms	3.5" HH	Seagate	SCSI	ST124ØØN	1,699
2100MB	8ms	3.5" HH	Seagate	SCSI	ST1255ØN - Barracuda	1,899
2100MB	11ms	5.25" FH	Seagate	SCSI	ST424ØØN	1,699
2900MB	11ms	5.25" FH	Seagate	SCSI	ST434ØØØN	2,099
3000MB	11.5ms	5.25" FH	Micropolis	SCSI	MC1936	2,099
3000MB	12ms	5.25" FH	Digital	SCSI	DE53ØØS	2,349
3572MB	12ms	5.25" FH	Digital	SCSI	DE535ØS	2,599
4000MB	12ms	5.25" FH	Digital	SCSI	DE54ØØS	2,799

Complete Kits!

DRIVE KITS INCLUDE:
Complete mounting kit including:
-5 1/4" Mounting Frame
-Data Cable
-Rail Set
-Screws
-Jumper Blocks
-Bezels

HDI's Hard Drive Installation Guide with step-by-step installation instructions.

FOR 8 BIT (PC/XT) KITS ADD:
Controller (when applicable)

FOR 16 BIT (286/386/486) KITS ADD:
1" to 1" interleave hard/floppy Controller or appropriate interface

32 BIT AND MAC KITS ALSO AVAILABLE

HARD DRIVES *International*

"A constant source for low prices, HDI wins an Editor's Choice for its excellent service and technical support. Its kits were among the most complete we saw and its detailed documentation will reassure even novices. Most importantly, our experience with HDI highlights its technical support staff's extensive knowledge and technical competence. These qualities promise to make purchasing a drive from HDI pain free." **–PC Magazine 3/93**

PC MAGAZINE PC MAGAZINE

"HDI servers for its sixth straight year as a best buy source."
- Computer Shopper 1/94

20,000 PRODUCTS 24 HOURS A DAY.

NETWORKING

3Com

Etherlink II 16 bit 3C503	$184
16 bit Ethernet Card 3C527	279
Etherlink III 10 Base-T 3C509B	132
Etherlink III Coax 3C509b	139
Etherlink III Combo 3C509	139
Etherlink III 4/16 10 pack 3C619	3,999
Etherlink III 32 bit 10 Base-T 3C579	229

ARTISOFT
Revolutionizing Connectivity

AE-2* Ethernet Starter Kit DOS	$429
AE-2 Ethernet Starter Kit Windows	559
AE-3* Ethernet Starter Kit DOS	549
AE-3 Ethernet Starter Kit Windows	599
LANtastic/AI (single node)	69
LANtastic/AI (up to 300 users)	1,499
LANtastic Win Network Utility	169
LANtastic for NetWare Netwk Oper Sys	299
ArtiCom Modem Sharing software	239
AEMbps Starter Kit DOS	349
AEMbps Starter Kit Windows	399
Extra AE-2 Boards	199
Extra AE-3 Boards	239
NodeRunner 2000/c	169

intel

Intel Ether Express 16	$99
Intel Ether Express 16 5 pack	449
Intel Ether Express 16 coax	119
Intel Ether Express 16 10 Base-T	99
Intel Ether Express Flash Combo	129
Intel Tokenexpress 16/4 LAN	369

EAGLE TECHNOLOGY

Networking Products - NetWare compatible 16 bit ISA adapters

NE2000 plus	$115
NE2000 plus 5 pack	499
NE2000plus	145
NE2000T plus 5 pack	639
NE2000 plus - 3	129
NE2000 plus - 35 pack	579
NE3210	189
NPE400	359
EP3210	189
EP3210 5 pack	879
EP3210T	179
EP3210T 5 pack	849

PCMCIA CARDS

Megahertz

2400/9600 bps MBXJ124FM	$289
14.4/14.4 bps MBXJ144	429
Intel Fax/Modem 2400/9600 bps	299
Intel Fax/Modem 9600/9600 bps	379
Intel Fax/Modem 14.4/14.4 bps	459
Xircom Network combo	339
Xircom Network RJ-45	299
Xircom Network BNC	299
US Robotics Fax/Mdm 14.4/14.4 bps	449
US Robotics Fax/Mdm 2400/9600 bps	309
Talon Network 10BT NWTA10BT	289
Talon Network 10B2 NWTA10B2	289

MODEMS

intel

Intel Internal 14.4 modem	$189
Intel SatisFAXtion 100	99
Intel SatisFAXtion 200	225
Intel SatisFAXtion 300	245
Intel SatisFAXtion 350	369
Intel SatisFAXtion 400	299
Intel SatisFAXtion 400e	329

PRACTICAL PERIPHERALS

PractiCARD PCMCIA	$419
PM14400FXMT Ext V.32bis	239
PM14400FX PKT Pocket V.42bis	Call
PM14400FX Internal V.42bis	219
PM14400FXSA External LCD	389
PM14400FX Internal d/i	219
PM9600FXMT External	229
PM9600FX Internal	209
PM2400EFXSA external	129
PM2400EFX Internal	99

PRINTERS

Canon

BJ-10SX CNBJ10SXW	$249
BJ-200 Bubble Jet CNBJ200K	299
BJ-230 CNBJ230	399
BJC-600 Color CNBJC600K	599
BJC-820 (SCSI) CNBJC820	1,499
LASER LBP-430 CNLBP430	849
LBP 8SX CNLBP8SX	999

EPSON

Epson AP3250	$174
Epson LX-810	169
Epson FX-870	274
Epson LQ-570+	239
Epson LQ-1070+	359
Epson LQ-870	439
Epson LQ-1170	589
Epson LQ-2550 Color	879
Epson DFX-5000	1,319
Epson DFX-8000	2,199

HEWLETT PACKARD

HP DeskJet 340 M4HPDJ340	$299
HP DeskJet w/Cut Sheet Feeder	399
HP DeskJet Color Kit	99
HP DeskJet Accessories	Call
HP DeskJet 500 M4HPDJ500	399
HP DeskJet 500C M4HPDJ500C	499
HP DeskJet 550C M4HPDJ550C	599
HP DeskJet 560C M4HPDJ560C	699
HP DeskJet 1200C M4HPDJ1200	1,419
HP DeskJet 500 w/Duplex M4HPDJ500A	699
HP PaintJet XL color M4HPPJXL	1,099
HP PaintJet XL300 color M4HPPJXL3K	2,249

LEXMARK

2380 MALEX2380	$319
2381 MALEX2381	449
2390 MALX2390	329
2391 MALEX2391	449
4029020 Laser 6 MALEX4029	999
4029030 Laser 10 MALEX10L	1,129
4037 SE Laser	699

NEC

P2200 24 Pin NCMDL2200	$329
P6200 24 Pin NCMDL6200	454
Silentwriter 1097 NCMDL1097	1,429

OKIDATA

OL400E Laser	$519
OL410E Laser	525
OL810 Laser	929
OL850 Laser	1,259
ML380 Dot Matrix	219
ML590 Dot Matrix	419
ML184 Dot Matrix	229
ML320 Dot Matrix	299
ML395 Dot Matrix	969
ML395C Dot Matrix	1,019
ML521 Dot Matrix	489
OL 830+ Dot Matrix	1,079

Panasonic

KX-P4410 Laser	$599
KX-P4430 Laser	899
KX-P4440 Laser	1,149
KX-P2023 Dot Matrix	195
KX-P2124 Dot Matrix	315
KX-P3123 Dot Matrix	299
KX-P3624 Dot Matrix	409

star

NX-2430 24 Pin Color	$249
LS-5EX Laser	749
SJ-144 Color Laser	459
SJ-48+ Ink Jet	279

FUJITSU

Print Partner 10 FJPP10K	$799
Print Partner 10W FJPP10WK	849

NOTEBOOK COMPUTERS

TOSHIBA

T1960 486DX2-40MHz 4MB RAM (expandable to 20MB) PCMCIA Slot, 9.5" Display

200MB Monochrome	$2,099
120MB Color	2,495
200MB Color	2,699
120MB Color	2,899
200MB Color	2,999
320MB Color	3,447

T3400

120MB Active Matrix Color	$3,494
120MB Active Matrix Color	3,271

T4700 486DX2-50MHz, 8MB RAM, expandable to 24MB) 2 PCMCIA (1-II, 1-III), 9.5" display, graphics accelerator and local bus video

200MB Dual Scan Color	$3,999
200MB Active Matrix Color	4,799
200MB Active Matrix Color	5,570
320MB Dual Scan Color	4,299

T8000 Laptop 486DX2-66MHz, 8MB RAM

6500C 510MB Color	$6,224
6600C/CD 510MB Color	6,742
6600C/CDV 510MB Color	7,777

NEW Toshiba Portégé - Intel Pen S Ser 33MHz SL enhanced i486SX 4MB/120MB, Type II PCMCIA, internal floppy drive

T3400CT Active Matrix	$3,449
T3400 Monochrome	2,199

NEC

Ultralite Versa E - 486DX2/40 - 50MHz, 4MB RAM, Exp 20MB, 2 Type II PCMCIA, MS DOS 6.2, Windows 3.1, Built-in

486 DX2/40 120MB Mono	$2,579
486 DX2/40 120MB Active Color	3,825
486 DX2/40 250MB Mono	2,999
486 DX2/40 250MB Active Color	4,234
486 DX2/50 209MB Mono	3,255
486 DX2/50 209MB Active Color	4,469
486 DX2/50 340MB Mono	3,873
486 DX2/50 340MB Active Color	4,919
486 DX2/50 250MB Mono	3,433
486 DX2/50 250MB Active Color	4,679
486 DX2/50 340MB Mono	4,119
486 DX2/50 340MB Active Color	5,364

TEXAS INSTRUMENTS

See our ad on previous page!

SOFTWARE

The lowest prices on thousands of titles.

Upgrade From: Excel, Quattro Pro, Word, WordPerfect, Wordstar, Display Write, PowerPoint, Harvard Graphics, Corel Draw, WordPerfect Presentations, Aldus Persuasion, MS Access, Paradox, dBase, FileMaker. Also Lotus 1-2-3, Symphony, Ami Pro, Freelance Graphics and Graphwriter. Must provide proof of ownership. Call for details.

SmartSuite 2.1 SWRW3LØ68	$389
SmartSuite 2.1 Upgrade SWRW3IØ69	259
Lotus 1-2-3, 4.01 SWRW3LØ54	279
Lotus 1-2-3 Upgrade SWRWLØ55	89
Approach 2.1 SWRW3IØ66	89
Freelance Graphics SWRW3LØ11	299
Ami Pro 3.01 SWRWDLØ1	209
Ami Pro 3.01/Quicken/Turbo Tax SWRW3LØ88	239
Ami Pro 3.01 Upgrade SWRW3LØ62	59
Organizer 1.1 SWRW3LØ77	89
CC: Mail Group pack SWRWDCX1Ø	499
Improv 2.1 SWRW3LØ53	269
SmartPics SWRW3LØ57	69

CAMBRIX Publishing

Complete House CD

A multimedia exploration of American residential architecture for people who may be building, remodeling or just interested in house design. SWRWCEQ13

$29

Small Blue Planet CD

Unveil both the splendor of earth as seen from space and the delicate balance of our planet through spectacular satellite imagery. Combines the hard facts of an atlas with the graphic splendor of a coffee-table book.. SWRWCEQØ7

$45

FREE "Fractal Sideshow" Screensaver with the purchase of any 2 Cambrix CD's!

Fractal Ecstasy™ CD SWRWCEQØ5	$35
A Line in the Sand CD SWRDCEQØ2	29
Electricity and Magnetism CD SWRDCEQØ3	29
Everywhere USA CD SWRWCEQØ9	$35
The Anglo-Saxons CD SWRWCEQØ8	$35
Adventures™ CD SWRWCEQØ4	35
National Parks CD SWRWCEQØ1	35
Coming Soon:	
Learn to Play Guitar CD SWRWCEQ11	35
Earth and Universe CD SWRDCEQ12	35
Sound Kitchen CD SWRWCEQ1Ø	35

CD-ROM DRIVES

Double speed

NEC

3X Triple Speed Drive	
Bare $469	Kit $549

Talon

Talon DS-100 320ms/300KB	$249
Talon DS-200 245ms/330KB	399

PLEXTOR

Model DM-3028	
Internal bare $299	Kit $359
External bare 389	w/controller 479

TOSHIBA

Model 3401	
Bare $429	Kit $499

MULTIMEDIA

CREATIVE

Sound Blaster Pro Deluxe	$125
Discovery CD 8 Internal Kit	385
Discovery CD 16 Internal Kit	485
Edutainment CD 16 Internal Kit	539
Sound Blaster 16 ASP	209
Sound Blaster MIDI Kit	59
Video Blaster	349
Video Spigot for Windows	469

MEDIA VISION

Fusion Double CD 16 System	$639
Pro AudioSpectrum 16 SoundCard	189

REVEAL

MultimediaFX - 01	$239
MultimediaFX - 02	399
MultimediaFX - 04	479
MultimediaFX - 08	599

Talon

TA-3000DS Multimedia kit	$649

MEMORY/SIMM

1MB x 9 80ns	$Call
1 MB x 9 70ns	Call
256KB x 9 70ns	Call
4MB x 9 70ns	Call
512 x 36 2MB	Call
1 x 36 4MB	Call
2 x 36 8MB	Call
4 x 36 16MB	Call

MONITORS

HITACHI

SuperScan 15s 15"	$499
SuperScan Elite 17"	1,199
SuperScan Pro 20"	1,649

Insight

15" 1024x768 NI, 28 dp, MRP II	$309
17" 1280x1024, NI, 28 dp, MPRII	699
20" 1280x1024, NI, 28 dp	1,299

NEC

15" MultiSync 3FGe CMNEC3FGe	$539
15" MultiSync 4FGe CMNEC4FGe	749
17" MultiSync 5FGe CMNEC5FGE	1,089
21" MultiSync 6FG CMNEC6FG	2,359

TAPE BACKUPS

COLORADO MEMORY SYSTEMS

250MB COJUMBO250	$199
120MB COJUMBO	99
Trakker 250MB COJT20	329
Trakker 120MB COJT10	299

CONNER

TapeStor 250MB Internal A25D	$139
TapeStor 250MB Ext. Par A250EP	359

EXABYTE

8mm 5.0Gig Model 8505	$2,599
8mm 2.2Gig Model 8205	1,699
8mm Tape Cartridge	16.95

IOMEGA

Iomega Tape250 Insider Internal	$189
Iomega Tape250 Insider Half-height	189
Iomega Tape250 PC Powered Ext	319

Talon 250MB Internal

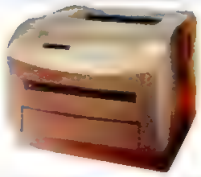
w/8 reformatted tapes TBTA250IK	$179
w/5 formatted tapes TBTA250IK5	229

WangDAT

4mm DAT 4GB 3200 Int. 16 Bit Kit	1,199
4mm DAT 4GB 3200 Ext. 16 Bit Kit	1,299

PRINTERS

TEXAS INSTRUMENTS



TI microMarc™ Inkjet Printer TEX1Ø23	$279
TI microLaser™ Pro 600 PS23 Printer TEX1Ø24	$1,349
TI microLaser Pro 600 PS65 TEX1Ø26	$1,529
TI microWriter™ PS23 Printer TEX1Ø21	$679
TI microWriter Basic TEX1Ø19	$499
TI microWriter PS65 TEX1Ø22	$929

If you don't see what you need -- call!

FREE Insight Catalog. Call now!

Insight

The Insight catalog is your Super Direct™ source for computers, hardware and software.

Prices and availability subject to change without notice. PCs Worry Free Guarantee and 1-Year Systems Warranty may have some restrictions. Shipping is non-refundable. All trademarks are the properties of their respective owners. Opened software is not returnable. Intel Inside is a registered trademark of Intel Corporation. ©Insight Direct, Inc. 3/15/94

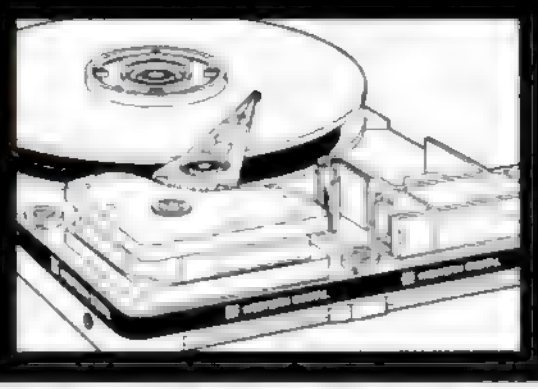
National Accounts - 800-998-8061
Corporate Fax - 602-902-1191
Government Fax - 602-902-1126
Educational Fax - 602-902-1177

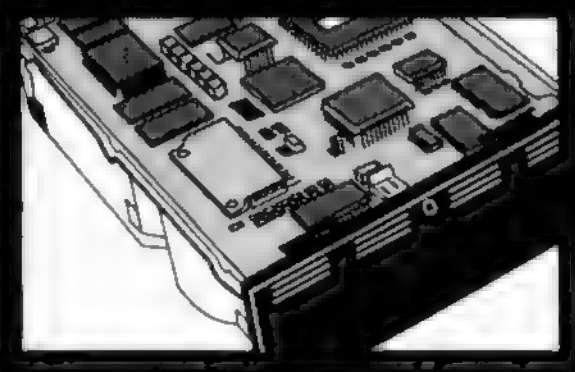
800-998-8018

CIRCLE 219 ON READER SERVICE CARD

MEGA HAUS HARD DRIVES

Your Drive Company!





UNEQUALED REPUTATION

Nobody knows drives like MegaHaus. We have specialized in storage solutions for over 7 years. Repeat business from satisfied customers is the backbone of our business. We satisfy our customers.

DIRECT REPLACEMENT WARRANTY

During the first year of your warranty, we replace: not repair, any defective items. All items receive lifetime technical support from our factory trained techs.

SAME DAY SHIPPING

Our multi-million dollar inventory offers you the best diversity and availability in the market. We ship most orders the same day. Each order is checked at least four times for accuracy.

FAST, EASY INSTALLATION

Anyone can sell you a hard drive. We sell easy to install storage solutions. We spend countless hours researching the best solutions, then create our quick precise installation guides for each kit.

SPECIALS

SyQuest Now available 270MB!

105MB Removable Media Drive. The #1 storage solution for the 1990's. Hard drive speed (14.5ms). Low cost per MB. Mounts is 3 1/2" or 5 1/4" bay. Great for unlimited upgradability, data archival, transport & exchange, just to name a few.

SQ3105A IDE Drive Bare	$249	SQ3105S SCSI Drive Bare	$279
with GSI-18 & 1 disk	$329	with Adaptec 1522 & 1 disk	$399
Portable external, attaches		with Adaptec 1542 & 1 Disk	$529
to printer port with 1 cartridge	$399	External for MacIntosh & 1 Disk	$399

GSI drive accelerators increase the data transfer rate of your IDE drive 30 to 80%. Works by enabling the drives Read Multiple & Write Multiple commands to greatly increase performance. We highly recommend these products for Conner, Quantum, Seagate, Micropolis, Maxtor, & Fujitsu.

	Alone	w/Drive
GSI-21 Board supports 2 IDE, 4 floppy drives. Doubles QIC-80 tape drive speed	$65	$55
GSI-18 Board supports 2 IDE drives. Works in conjunction with MFM, RLL, etc.	$55	$45
GSI-32 Board same as -21 adds 2 16550 serial ports & 1 bi-directional parallel port	$139	$119
GSI MaxIDEA Software solution works on existing IDE configuration (requires less than 1K of memory). Includes performance benchmark test.	$34	$25

HARD DRIVES

CONNER

IDE			
210MB	14ms	CFS210A	$219
340MB	13ms	CFA340A	$289
420MB	14ms	CFS420A	$329
541MB	12ms	CFA540A	$CALL

digital

SCSI			
1600MB	9.7ms	DSP3160	$1159
2103MB	9.7ms	DSP3210	$1559
3500MB	11ms	DSP5350	$2399
4000MB	11ms	DSP5400	$2599

FUJITSU

IDE			
520MB	12ms	M2624T	$499
SCSI			
520MB	12ms	M2624F	$499
1080MB	9ms	M2694ESA	$829
2060MB	12ms	M2654ESA	$1449

Maxtor

IDE			
245MB	15ms	7245A	$229
345MB	14ms	7345A	$288
540MB	14ms	7540A	$539
540MB	8.5ms	MXT540A	$479
SCSI			
245MB	15ms	7245S	$259
340MB	14ms	7345S	$329
545MB	8.5ms	MXT540SL	$689

MICROPOLIS

IDE			
1050MB	10ms	MC2210A	$846
1740MB	10ms	MC2217A	$1122
SCSI			
1050MB	10ms	MC2210	$846
1052MB	8.5ms	MC4110	$915
1740MB	10ms	MC2217	$1122
2100MS	11ms	MC1926	$1438
3020MB	11ms	MC1936	$2065

Differential Wide SCSI! The ultimate setup for speed. Price includes EISA card & cables! MC2210DW $1899 MC2217DW $2199 MC1936DW $3229

Also available Audio / Visual tuned drives!

WESTERN DIGITAL

IDE			
256MB	12ms	AC2250	$235
341MB	12ms	AC2340	$270
425MB	12ms	AC2420	$335
540MB	11ms	AC2540	$449

Boost WD performance 26% with MaxIDEA!

HARD DRIVES

Quantum

IDE			
170MB	14ms	LPS170A	$189
270MB	12ms	LPS270A	$229
342MB	12ms	LPS340A	$279
541MB	12ms	LPS540A	$469
SCSI			
170MB	14ms	LPS170S	$189
270MB	12ms	LPS270S	$249
342MB	12ms	LPS340S	$289
541MB	12ms	LPS540S	$479
1080MB	10ms	IMP1080	$849
1225MB	10ms	PD1225S	$959
1800MB	10ms	PD1800S	$1139

Seagate

IDE			
213MB	16ms	ST3243A	$199
260MB	16ms	ST3290A	$229
341MB	12ms	ST3390A	$295
452MB	12ms	ST3550A	$395
528MB	12ms	ST3655A	$499
SCSI			
2145MB	8ms	ST12550N	$1859

CONTROLLER CARDS

ADAPTEC	Alone	w/Drive
A1522BASIC 16Bit SCSI	$99	$89
A1542CBASIC 16Bit SCSI	$225	$210
A2742 EISA SCSI	$389	$369
A2842 VESA SCSI	$319	$299
T130 8Bit SCSI	$79	$65
T348 Parallel to SCSI	$189	$179
FUTURE DOMAIN		
850MCD 8Bit SCSI	$79	$65
1680SVP 16Bit SCSI	$155	$139

Many other types of controllers in stock.

HARD DISK CARDS

Drive & controller on card. Saves drive bay. Compatible with XT, AT, Tandy, and others.

170MB	$269	240MB	$339
340MB	$439	525MB	$779

IBM PS/1 PS/2 DRIVES

Complete solutions for your IBM. IBM recomends & buys from MegaHaus!

	170MB	240MB	340MB
PS/1 386 & 486	$239	$309	$389
PS/2 25, 30, 30-286	$299	$389	$479
PS/2 35 & 40	$229	$299	$379
PS/2 50 thru 95	$379	$459	$559

Larger capacities in stock. PS/1 286 120MB $589

MULTI-MEDIA KITS

Includes:
- Double speed CD ROM drive
- Media Vision Jazz 16
  Pro Studio add $100
- Amplified Speakers
- Toolworks CD Bundle (World & US Atlas, Groliers Encyclopedia, San Diego Zoo's The Animals, Chessmaster3000, Mavis Beacon Teaches Typing)

Toshiba	XM3401	200ms	$589
Sony	CDU 561	295ms	$559
Sony	33A	325ms	$399
Teac	CD-50	265ms	$539

ALTEC LANSING SPEAKERS CALL $

CD ROM DRIVES

NEC	3Xi	195ms	$469
Toshiba	XM3401	200ms	$365
Toshiba	XM4101	320ms	$255
Sony	CDU561	295ms	$329
Teac	CD-50	265ms	$309

CD Caddies with drive only $4 each!

6 Disc Changer (New 18 disc changer call)

Pioneer	DRM600	600ms	$839
Pioneer	DRM602X	300ms	$949
Pioneer	DRM604X	300ms	$1189

CD SOFTWARE

CD Software not sold separately only with CD ROM Drives.

Bundle 1 San Diego Zoo's The Animals,Toolworks Reference Library, Toolworks/Groliers s Multimedia Encyclopedia , Toolworks World & US Atlas Pak, & Tempra Photo CD Access $89

Bundle 2 San Diego Zoo s The Animals, Toolworks Reference Library, World Atlas, US Atlas with Auto Map, Sherlock Holmes, Sports Best, Arthur s Teacher Trouble, Chessmaster 3000, & Family Choice (15 titles incl. Berenstain Bears) $159

Bundle 3 Toolworks Encyclopedia, Reference Library, World & US Atlas,Game Pack, Secret Weapons of the Luftwaffe $79

Power Tools A great shareware library	$25
Family Doctor answers to 1500+ questions	$66
Game Pak II 10 games incl. Chessmaster 3000	$19
The Lord of the Rings A great new game	$45
Languages of the World 12 language translations	$32
Mayo Clinic medical ailments reference	$19
US Atlas w/ auto map intelligent road atlas	$29
CIA World Tour 248 CIA country profiles	$22

OPTICAL DRIVES

Kit is 16Bit Card & 1 disk		Bare	Kit
128MB	Fujitsu	$725	$879
1.3Gig	Hewlett Packard	$2499	$2759
1.3Gig	Maxoptix	$2699	$2959
Verbatim Optical Media	1		5
128MB / 650MB		$42/$109	$38/$95

Many other brands and types in stock.

TAPE DRIVES

CONNER

250MB QIC-80 tape drives includes software & tape

	Alone	w/drive
Internal fits 3.5 or 5.25 bay	$155	$139
External for printer port	$325	$315

SCSI Tape Drives

Kit is 16Bit card & 1 tape			Bare	Kit
580MB	Teac	MT01	$449	$639
750-1.5Gig	Exabyte	2501	$599	$799
2Gig	Conner	4320	$799	$969
2Gig	HP	35470	$929	$1049
2-5Gig	Exabyte	8205	$1449	$1699
4-8Gig	Conner	4324	$1119	$1329
4-8Gig	HP	35480	$1059	$1279
4-16Gig	Sony	SDT5000	$1199	$1429
5-10Gig	Exabyte	8505	$2259	$2519

REMOVEABLE DRIVES

Syquest			Bare	Kit
44/88MB	20ms	SQ5110C	$259	$439

Syquest Media Best Price in this mag!

TEAC

	Alone	w/HD
Floppy 1.4 (1.2 + $9)	$45	$42
Floppy Combo 1.2 & 1.4	$124	$117

Removable Hard Disk Drive Kits
Very high quality removable drive
17ms IDE drive with docking bay
250MB $309 360MB $379

DRIVE ACCESSORIES

SCSI Drive enclosures

3.5" vertical	$99
Half Height	$89
Full Height / Dual Half Height	$139
Dual Full Height / Four Half Height	$329
Four Full Height / Eight Half Height	$549
Removable drive brackets, turns any 3.5" hard drive into removable IDE / SCSI	$69/$119

PCMCIA

Maxtor 105MB, 19ms hard drive	$559
PCMCIA to SCSI adapter	$319
Desktop Docking Module! Mounts in 5 1/4" drive bay. Allows you to use any PCMCIA in your desktop	$249

MEMORY

	Alone	w/HD
1x3-70ns (60ns + $3)	$50	$47
1x9-70ns (60ns + $4)	$60	$56
4x9-70ns (60ns + $5)	$169	$159

MEGA HAUS HARD DRIVES
1110 NASA Rd 1 #306
Houston, Texas 77058

1-800-786-1182

Ad. Code # PA31 Sales Hours (Central Standard Time)
8am - 7pm Monday thru Friday 9am - 3pm Saturday
FAX (713) 333-3024 Local (713) 333-1910
We sale within the United States, its territories, and Canada (sorry no international orders)

VISA MasterCard DISCOVER AMERICAN EXPRESS

NO SURCHARGE
We accept Fortune 500 & Government bids & PO's.
We check for COD and Credit Card fraud!

Prices & specifications subject to change without notice. Shipping charges are nonrefundable. Returns must be in new condition and in original packaging. Defaced items may not be returnable. No refunds on software or special orders (items not listed on ad.) All refunds subject to 15% restocking fee. All trademarks are registered trademarks of their respective companies. Personal checks held for clearance. We reserve the right to refuse any sale for any reason. ©1993

CIRCLE 018 ON READER SERVICE CARD

M E M O R Y !

H.Co. has America's largest selection of memory products, and we'll beat any USA advertised price!

PCMCIA PRODUCTS

BRAND NEW DEALS!

SRAM

1MB SRAM Card	$135.00
2MB SRAM Card	265.00
512K for Apple Newton	125.00
1MB for Apple Newton	165.00
2MB for Apple Newton	265.00

FLASH

2MB Flash Card	$265.00
4MB Flash Card	485.00

HARD DRIVES

85MB Type III	$515.00
105MB Type III	565.00
85MB Type II+	495.00
130MB Type III+	675.00

FAX MODEMS

9600/4800	$155.00
14.4/14.4	265.00
14.4/28.8	335.00
28.8/28.8	CALL

PERIPHERALS

10-Base T Network Adaptor	$179.00
Internal Desktop PCMCIA Card Reader	285.00

Math Coprocessors And CPU Upgrades

INTEL Overdrive

486-33 (66 Mhz)	$545.00
486-25 (50 Mhz)	415.00
486-16/20 (40 Mhz)	315.00

INTEL

80387DX	$89.00
80387SX	87.00
80387SL	87.00
80287XL/XLT	72.00

IIT

80387-40	$82.00
80387-33/25	69.00
80387SX-33	75.00
80387SX-25/20	64.00

CYRIX Overdrive

386-25 to 486-25	$95.00
386-33 to 486-33	115.00
386-40 to 486-40	145.00
386sx20 to 486-40	275.00
386-16 to 486-32	285.00
386-20 to 486-40	335.00
386-25 to 486-50	375.00

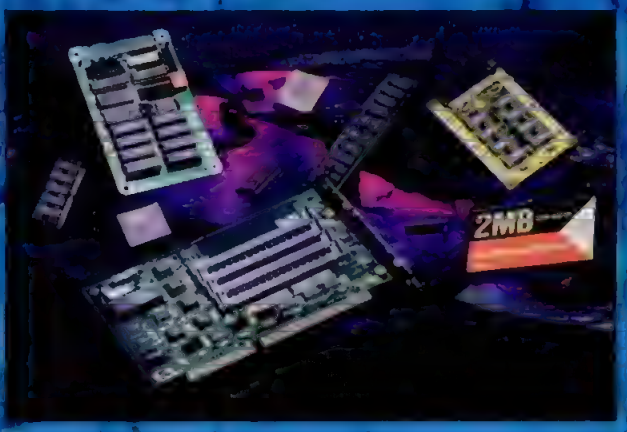
Ask us how you can turn your 386DX into a 486 using a Cyrix processor upgrade

Kingston processor upgrades also available

Laser Printer Memory

HP Laserjet II, IID, IIP, III, IIID	2MB SD	$99.00
	4MB SD	175.00
HP Laserjet 4L	1MB MD	68.00
HP Laserjet 4, 4M, 4P, IIIsi	2MB MD	95.00
	4MB MD	162.00
	8MB MD	299.00
HP Deskjet 500, 500C, 550C	256K MD	59.00
IBM 4019, 4019e	2MB MD	119.00
	3.5MB MD	189.00
IBM 4029, 4039 4079	2MB SD	89.00
	4MB SD	169.00
OKI Laser 400	2MB MD	99.00
OKI Laser 800, 820	2MB MD	129.00
	4MB MD	199.00
Panasonic 4420, 4450i, 4410, 4430	2MB MD	119.00
	4MB MD	189.00
Panasonic 4455	2MB MD	159.00
Epson EPL6000	4MB MD	189.00
Epson EPL 7500	2MB MD	145.00
	4MB MD	225.00
Epson Action Laser II	2MB MD	149.00
	4MB MD	229.00
Canon LBP-III, IIIPlus	2MB SD	239.00
	3MB SD	195.00
Canon LBP-4	2MB SD	145.00
Canon LBP-4SX	4MB MD	219.00
TI MicroLaser, XL	1MB MD	49.00
	4MB MD	229.00

German Office: **H.Co. Computer Products, Inc.**
Deisterstrasse 11 • 30449 Hannover, Germany
Tel: 0511-458-2411 Fax: 0511-458-2440



Desktop Memory Upgrades

AST

Bravo 486/25	2MB KIT	$110.00
	8MB KIT	287.00
Bravo 4/66d,50d,33 33s 25s	4MB MD	145.00
	8MB KIT	289.00
	16MB MD	619.00
Prem 386/SX 16, 20, 25, 33	8MB KIT	289.00
Prem II SX/33, 25, 20, 16	1MB KIT	55.00
	4MB KIT	149.00
Cupid Exp	0MB BD	219.00
Prem 386c Wkst&Bravo 286	4MB KIT	179.00

NEC

PM SX,SX PLUS	2MB BD	$219.00
	4MB BD	279.00
	8MB BD	519.00
PM SX/20	2MB CPU UPG	169.00
	2MB UPG EXP	209.00
	2MB UPG KIT	89.00
PM SX/16	2-8MB BD	189.00
	2MB UPG KIT	85.00
PM 386/20, 25	2MB MD	299.00
	8MB MD	699.00
PM 386/25	8MB REP BD	999.00
PM 386/25S	2MB KIT	159.00
	8MB KIT	499.00
PM 386/33E, 486/25E	2MB MD	199.00

COMPAQ

DP 386/33,486/25,33,System Pro	2MB MD	$97.00
	8MB MD	289.00
DP 386/20e,20,25e,25 386s/16	4MB BD	269.00
	4MB MD	169.00
DP 386N,386SX/20 ProSignia	2MB MD	79.00
	4MB MD	159.00
ProSignia	8MB MD	309.00
ProLinea 4/25s,33,50	8MB MD	309.00

IBM

502,55SX,LS,65SX,LS,70-E61,70-121,P-70	1MB MD	$50.00
	2MB MD	80.00
55SX LS 65SX,LS	4MB MD	149.00
70-A21,70-A61,70-B21,70-B61	2MB MD	80.00
30/286	2MB KIT	80.00
PS/1 286, 386SX	2MB UPG	90.00
80-041	1MB BD	79.00
80-111 31	2MB BD	99.00
80-A21,A31,A61	4MB BD	149.00
57,57SX,90,95 PS/1 Pro	4MB MD	149.00
	8MB MD	289.00
70,80	4-14MB BD	279.00
50 & 60 SERIES	4-14MB BD	259.00

SIMM MODULES

1X9-80	$48.00	2X8-80	$88.00
1X9-70	49.00	4X8 70	149.00
1X9-60	54.00	16X8-70	565.00
1X9(3)-70	45.00	512X36-80	90.00
4X9-70	154.00	1X36 80	169.00
1X8-80	47.00	2X36-70	359.00
1X8 70	48.00	4X36-70	649.00

H.Co. Computer Products is licensed to manufacture modules from the inventor of standard PC technology simms!

H.Co Supports Fully Compatible Memory For These Leading Systems:
ALR • Apple • AST • AT&T • Canon
Compaq • Data General • DEC • Dell
Epson • Everex • HP • IBM • NCR • NEC
Olivetti • Packard Bell • Panasonic • Sun
Tandy Graphics • TI • Toshiba • Zenith
and more...

H.Co. is now open weekends!

Laptop Memory

TOSHIBA

T2000SX,SXE,T1800,T1850	4MB	$169.00
	8MB	319.00
T3100SX,T3200SX,SXE	2MB	89.00
	4MB	149.00
T3200	3MB	149.00
T5100	2MB	89.00
T5200,C,T8500	2MB	89.00
	8MB	299.00
T3100	2MB	189.00
T4400 T6400,T3300	2MB	139.00
	4MB	189.00
T4400,T6400	8MB	389.00
T4500	4MB	209.00
	8MB	419.00
	16MB	999.00
T1600, T4600	4MB	259.00
	8MB	475.00
	16MB	1099.00

IBM

L40SX, N51	4MB	149.00
	8MB	295.00
CL57SX, Thinkpad	4MB	349.00
	8MB	659.00
PS Note	2MB	CALL
IBM RECOMMENDED	4MB	CALL
	8MB	CALL
PS Note 486	4MB	CALL
	8MB	CALL
	16MB	CALL

COMPAQ

Contura 3/20,25	4MB	197.00
	8MB	419.00
Contura 425	4MB	199.00
	8MB	429.00
LTE Lite/20,25,25c	4MB	229.00
	8MB	395.00
LTE Lite 4/25c	4MB	249.00
	8MB	399.00

NEC

UltraLite III,SL/25c	2MB	$149.00
	4MB	249.00
UltraLite SL/20 SL/20P	4MB	207.00
	6MB	297.00
Prospeed 386	2MB	147.00
	8MB	449.00

CANON

NoteJet 486	2MB	$159.00
CANON RECOMMENDED	4MB	259.00
	8MB	459.00

ZENITH

Z-Note	2MB	$169.00
	8MB	489.00
Z-Sport	2MB	129.00
MastersPort SL,SLC,SLE	2MB	109.00
MastersPort 386SX	2MB	119.00
SlimsPort	2MB	139.00
	4MB	279.00

OTHERS

TI TravelMate 2000	1MB	$89.00
TI TravelMate 3000	2MB	95.00
TI TravelMate 4000	4MB	219.00
AST PremExec	4MB	135.00
AST PowerExec SL,EL	4MB	179.00
Apple Powerbook (All)	Call for current prices	

All H.Co. Manufactured Memory Products Carry A Lifetime Warranty!

Call H.Co.'s Memory Experts Toll Free

1-800-RAM-CHPS or 1-800-726-2477

Place your order by 4pm (PST) and we'll ship it today

H.Co. Computer Products, Inc.
17922 Skypark Circle Suite F
Irvine, CA 92714
Office: 714-833-3222
Tech Support: 714-833-3364
FAX: 714-833-3389

PO's Accepted From Universities, Government Agencies, and Qualified Firms.

TERMS:

1. VISA MC AMEX, Discover C.O.D., Pre-paid and Approved PO's only
2. FAX orders, and International orders accepted
3. 15% Restocking fee on returns within 30 days. No refunds after 30 days
4. All returns require an RMA number, sorry no software returns
5. All credit card purchases are verified for your protection

H.Co will beat or match prices from companies with new merchandise actually in stock. Offer excludes Chips and SIMMS. Minimum order $100.00. Due to T.C. tariffs placed on some manufactures' memory pricing may be higher than advertised. H.Co. same-day shipping guarantee applies only to products in stock. Trademarks are the property of their respective companies. Prices are subject to change without notice.

CIRCLE 3[illegible] READER SERVICE CARD COMPUTER RESELLERS CIRCLE 349 ON READER SERVICE CARD

BULLDOG COMPUTER PRODUCTS RECEIVED PC COMPUTING'S ★★★★ MAIL ORDER AWARD!!!

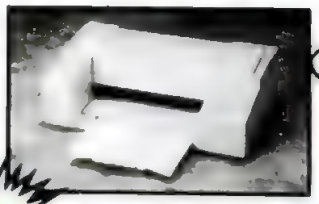
CALL 1-800-438-6039

Canon

NOTEJET 486 - SLC/25

- 486 SLC/25 Mhz
- Built-In "Bubble-Jet" printer
- 4 MG Ram

85 MG - $2139 • 135 MG - $2349
180 MG - $2549



Byte Magazine Best Buy!

Epson Stylus 800—$279

Network

3COM

3C503/5-pack	179/789
3C503TP 10 Base T	219
3C507 Etherlink 16	279
3C523 MCA Ethernet	279
3C619	449
3C509-Etherlink 3	119
3C509-5 Pack	529

ARTISOFT

Starter Kit 2mbps/AE2	325/429
Lan Cards 2mbps/AE2	129/185
Central Station	385
Lantastic Noderunners	NEW!
2000/C Starter Kit	429
2000/C add on Kit	169

CALL FOR OTHER LANTASTIC PRICES!

INTEL

Ether Express 16/16TP	89
Ether 16-20 Pack	1639
Token Express 16/4 ISA/MCA	479
EtherExpress EISA	449

NOVELL

NE1000/NE2000	99/119
NE3200	659
Novell Lite 1.1/starter kit	69/409
Netware 2.2 5/10 User	479/1059
Netware 3.12 5/10 User	579/1299
Netware 3.12-25 User	1849
Netware 3.12-50 User	2349
Netware 3.12-100 User	3299
Netware 4.0-5/10 User	859/1959
Netware 4.0-25 User	2899
Netware 4.0-50 User	3890
Netware 4.0-100 User	5475
Netware 4.0-250 User	9799

SMC

PC130/PC130E	75/99
PC600WS/PC600FS	129/199
Ethercard 8 bit/16 bit	89/119
10 Base-T Card 8 bit/16 bit	99/119
3608TP 108T concentrator	325
3512TP Ether.10BT conc. 12 port	579

XIRCOM

Pocket Ethernet PE3-10B	269
Pocket Ethernet PE3-10BT	269
Parallel Port Multiplexor	79

Software

Aldus Pagemaker 5.0	509
Carbon Copy/Close Up	129/119
Clarion ProDeveloper	299
Clipper 5.2	479
Corel Draw 4.0	359
Dbase IV V.2.0	409
FoxPro 2.5	299
Framemaker	549
Freelance Plus 4.0	299
Harvard Graphics	359
Lotus 2 4/3.1+	275/339
NEW! Lotus 3.4	325
Lotus for Windows	279
Smart Suite Bundle	399
MS DOS 6.0	In Stock
Microsoft Windows 3.1	79
Microsoft Windows N/T	309
Microsoft Windows for Workgroup	139
Microsoft Access 1.0 for Windows	299
Microsoft Excel 4.0 for Windows	299
Microsoft Bookshelf - CD	129
Microsoft Office	449
Microsoft Word for Windows	289
Norton Desktop for Windows	119
Norton Utilities 7.0	105
Peachtree III Complete DQ	179
Paradox v4.5	519
Q&A 4.0	179
Ventura Desktop Pub	Best Price!
Winfax Pro	89
Word Perfect 6.0	249
Word Perfect for Windows	268
Word Perfect 6.0 Upgrade	99

Notebooks

CANON

486 SLC/25, 120 mg	1499
486 SLC/25, 120 mg-color	2199
Notejet 486 w/printer-85mg	2139
Notejet 486 w/printer-135 mg	2349
Notejet 486 w/printer-180 mg	2549

EPSON

486 DX2/120 mg	1619

TEXAS INSTRUMENTS

4000 SX25 W/120	1835
4000 DX2/50 W/200	2639
4000 DX2/40 Color W/200	2889
4000 DX2/50E Active Color	3749

Monitors

NEC MULTISYNC

3FGE/3V	579/499
4FGE	679
5FG/5FGE	1245/1049
5FGP	1319
6FG/6FGP	2289

CTX

1560 15" SVGA	379
5468/1451	249/279
1760 17" SVGA	719

MAG

MX15F 15" .28	495
MX17F 17" .28	879

NANAO

NEW! F550iW	1089
F550i/T560i	995/1649
NEW! F340iW	689

VIEW SONIC

15/17-7	429/799
20/21	1529/1789

Video Cards

ATI

Graphics Ultra+2 mg	229
Graphics Ultra Prof w/2 mg	329

BOCA

Basic VGA	47
Super VGA 1 mg	109

Modems & Fax

BOCA

14.4 Fax Modem Int/Ext	129/149

CARDINAL

2400 Int/Ext	42/65
14.4 Int/Ext	169/179

HAYES

Optima 96	319
Optima 14.4 Ext/Fax	369
14.4 fax modem Int/Ext	189/199
Accura 2400B Int/Ext	59/75

INTEL

14.4/14.4 Fax Int/Ext	149/169
PC MCIA 24/96	179
PC MCIA 14.4/14.4	279
Satisfaction 300 14.4/9600 Fax	219
Satisfaction 400/400E	259/295

PRACTICAL PERIPHERALS

PP 14400 Fax Int	159
PM 14400 FXMT ext v.32 bis	169
PM 14400 FXPPM Pocket Mod	269
PP 9600 Int/Ext	159/179

US ROBOTICS

Sportster 14.4 Int	145
Sportster 14.4 Fax/Int	149
Sportster 14.4 Fax/Ext	169
Courier HST Dual 16.8	659
PCMCIA 14.4	295

Printers

CANON

BJ10ex	239
BJ200	285
BJ230	389
BJC600	579
BJC800	1449
LBP-430	579

EPSON

LX810	169	LQ870	425
AP 2250	119	LQ1070+	355
AP 3250	169	LQ1170	589
FX870	259	LQ2550	879
FX1170	345	DFX5000	1299
LQ570	235	DFX8000	2189

Action Laser 1000	579
Action Laser 1500	639
Stylus 300 Inkjet	239
Stylus 800 Inkjet	279

HEWLETT-PACKARD

Laserjet IV w/toner	1369
Laserjet IVM w/toner	1929
Laserjet IVL	675
Laserjet IVP	989
Laserjet IVMP	1379
Laserjet IVML	1039
HP IVsi	2989
Deskjet 500/500c	309/409
Deskjet 550c	489
HP Deskjet 1200c	1369
HP Deskjet 1200c/ps	1939

LASER ACCESSORIES

Upgrade for HP I mb	79
Upgrade HP 2mb/4mb	99/159
Jet Direct 2371A	399
Pacific Data 25-N-I	239
Pacific Page PE/PEXL	259/699

OKIDATA

ML184/380	229/209
ML320/321	295/415
ML520/521	369/489
ML590/591	415/569
395/395c	959/1029
Laser 400E/810	495/899
Laser 410E-600 DPI	669
830I/850	1089/1199
PM3410	1199

NEC

Jetmate 1000	269
P6300	599

PANASONIC

2023/1124i	199/229
1624/1654	379/519
2180/2123	169/229
2124/1695	295/369
2624 24 pin wide	369
4410 laser/4430	535/639
4440/4455	999/1659

Mice & Misc.

Epson Action Scanning	779
Microsoft Mouse w/Windows 3.1	139
Logitech 256 w/OmniPage	185
Logitech Color Scanner	439
HP Scanjet IIP w/interface	719
HP Scanjet IIC w/interface	979
Summasketch 12×12	255

AMERICAN POWER

Back-ups 250/400/450	99/159/189
Back-ups 600/900	259/369

Bulldog Systems

Dual Floppy Drives • Super VGA w/1 Mg • 14" SVGA Monitor - .28 • DOS 6.0 • Windows • Mouse • • Local Bus
1 year warranty!

386SX-40 w/2MB w/80 Mg	999
486SX-25 w/4MB w/170 Mg	1299
486SLC-66 w/4MB w/245 Mg	1499
486DX-2-66 Loc Bus,8 MB,340 Mg	2199

Call for other configurations

CANON INNOVA SYSTEMS

486SX-20 w/4MB w/120 Mg	1239
486DX-50 w/4MB w/240 Mg	1649
486DX-66 w/4MB w/245 Mg	1899

Canon systems include dual floppys, Super VGA Monitor, Fax Modem, Mouse, D.O.S., Windows, Works, Vesa Local Bus

Drives

CONNER

120 mg/175 mg	179/199
212 mg/540 mg	239/649

IOMEGA

NEW! Bernouli Multidisk

Transportable 150	559
Insider 150	499
Tape 250 mg insider	199
Tape 250 mg. ext.	319
21MB Floptical Insider	349

MAXTOR

7131A 131 IDE	175
7213A 210 IDE	199
7245A 245 IDE	235

SEAGATE

ST3144A	179
ST3283A 245 mg IDE	279
ST3290A 260MG	225
ST3550A 452MG	409

FLOPPY DRIVES

1.2MB/1.44 MB	59
Micro Solutions 1.2MB/1.44 MB	159
Teac Dual Floppy Drives	119

Tape Drives

CONNOR — 250	149

COLORADO MEMORY SYSTEMS

DJ10 120 Meg Int Jumbo	119
DJ20 250 Meg Int Jumbo	159
Trakker 120	275
Trakker 250	315
2120 Formatted Tape	21

MICRO SOLUTIONS

80/250 Backpack	339

CD Rom

Triple Speed!

NEC

3Xe/3Xi	549/439
3XP/4X Pro	429/899

PANASONIC

CD, Sound, Titles	349

Chips

1 mg/4 mg Simms	49/149
HP 4mg/8 mg	159/339

INTEL

387 SX or DX	85
Overdrive SX20/25	279/295
Overdrive DX25/33	295/475

NO CHARGE FOR CREDIT CARDS!

3241 E Washington Rd
Martinez, GA 30907
Open weekdays: 8:30 a.m. to 8:30 p.m.
Saturday: 9:00 a.m. to 5:00 p.m.
(706) 860-7364 — (706) 860-7358
Shipping (706) 229-6366

BULLDOG COMPUTER PRODUCTS

Prices and availability subject to change without notice.

CIRCLE 015 ON READER SERVICE CARD

GLOBAL HORIZONS

GLOBAL SERVICE CENTRE

Call 1-800-57-SERVE
GET THE FAX!

IT'S HARD TO BEAT OUR DRIVE!

CONNOR			
CFS120A	IDE	124MB	168
CFS210A	IDE	210MB	209
CFA540A	IDE	540MB	549
P30540	SCSI	540MB	549
CP31370	**SCSI**	**1.37G**	**1025**
FUJITSU			
2624	SCSI	540MB	569
2694	SCSI	1.0G	969
2654	**SCSI**	**2.0G**	**1569**
SEAGATE			
ST3144	MFM	40MB	179
ST3144A	IDE	130MB	CALL
ST3290	**IDE**	**260MB**	**219**
ST3390	IDE	330MB	293
ST3500A	IDE	452MB	395
ST3500N	SCSI	457MB	525
ST31200	SCSI	1.0G	979
MAXTOR			
7131A	IDE	130MB	CALL
7245A	IDE	260MB	225
7345A	**IDE**	**340MB**	**289**
540A	IDE	540MB	575
540S	SCSI	540MB	675
1240S	SCSI	1.2G	1189
MICROPOLIS			
2205A	IDE	528MB	699
2205	SCSI	566MB	699
2210A	**IDE**	**1.0G**	**905**
2210	SCSI	1.0G	905
2217	SCSI	1.7G	1195
1528	SCSI	1.2G	975
1926	SCSI	2.0G	1.89
1936	SCSI	3.0G	2169
WESTERN DIGITAL			
1210	IDE	210MB	215
2250	**IDE**	**250MB**	**219**
2340	IDE	340MB	275
2420	IDE	420MB	338
QUANTUM			
ELS127S	**SCSI**	**120MB**	**185**
LPS170A	IDE	210MB	262
LPS270S	SCSI	270MB	275
LPS525S	SCSI	525MB	525
FLOPPY DRIVES			
SONY 3 1/2" 1.44MB			49
TEAC 3 1/2" 1.44MB			49
TEAC 3 1/2" 2.88MB			**89**
TEAC 5 1/4" 1.2MB			55
TEAC Dual Floppy Drive			119
SCSI CONTROLLERS			
Adaptec 1510A IDE Rom			89
Adaptec 1522A w/Floppy			99
Adaptec 1522A Kit			119
Adaptec 1542CF Busmaster			**192**
Adaptec 1542CF Kit			249
Adaptec 1542C Kit			309
Adaptec 1640 MCA			269
Adaptec 2740 EISA			**379**
Adaptec 2742 EISA Kit			349
Adaptec 2842 Local Bus			269
Adaptec 2842 Local Bus Kit			299
Adaptec EZ-SCSI Software			59
Future Domain 7000 EISA			369
Ultrastor 12C IDE Caching			**379**
Ultrastor 14F Busmaster			229
Ultrastor 24F EISA			399
Ultrastor 34F Local Bus			289
Future Domain 7000 EISA Busmaster			369
IDE CONTROLLERS			
16 Bit Enhanced Kit w/Multi I/O			39
BOCA 16 Bit Enhanced			39
16 Bit IDE w/Modem & 16550 UART			69
16 Bit IDE w/Multi I/O			89
PROMISE TECH VLB Caching Controller 4OK			149

TAPE DRIVES

ARCHIVE Viper 525MB SCSI Int	499
ARCHIVE Python 2GB SCSI Int	1199
COLORADO DJ10/DJ20	99/163
COLORADO JT10/JT20	**275/315**
COLORADO PowerTape 2-4G	945
CONNER TapeStor OC2000 250MB	**149**
CONNER TapeStore CFT 3200 Int	179
OMEGA 4-Mm Internal	CALL
OLYMPUS MAYNSTREAM DAT 2.0G Int	**1599**
MICRO SOLUTIONS PC-BACKUP II	
MOUNTAIN FS850 w/Mac Kit	34
MOUNTAIN FS850 w/Mac Kit	43

All Drives Are **New** & **In-Stock** • Dedicated Tech Support 708/ 949-9371

Guaranteed Lowest Prices!!

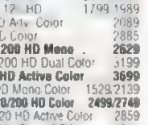
NOTEBOOKS

AST Bravo NB 4/25 120 HD Mono Color	1199/1429
AST Bravo NB 4/25 120/250 HD	2179/2679
AMPAQ Concerto 4/25 120/250 HD	2949
AMPAQ Concerto 4/33 25 HD	3949
AMPAQ Contura 4/25 120/209	IN STOCK
AMPAQ LTE Lite 4/25 120/209	3949/4349
T TM4000 Win SX DX 25 120 HD	1799/1989
T TM4000E Win SX DX 25 120 HD Active Color	2089
T TM4000 DX2 40 200 HD Color	2885
T.I. TM4000E Win DX2/50 200 HD Mono	**2629**
T.I. TM4000E Win DX2/50 200 HD Dual Color	3199
T.I. TM4000E DX2/50 200 HD Active Color	**3699**
TOSHIBA T1900 SX20 120 HD Mono Color	1529/2139
TOSHIBA T1950CS DX2/40 120/200 HD Color	**2499/2749**
TOSHIBA T1950CT DX2 40 120 HD Active Color	2859
TOSHIBA T3400 486SX/20 120 HD NEW	CALL
TOSHIBA T4600 4/33 120 HD Mono Active	2499/3899
TOSHIBA T4600 T.F.T. SX 120HD Active Color	4939

NOTEBOOK SPECIAL

T.I. TM4000E WinSX/25

TEXAS INSTRUMENTS **$1799**



- 486SX/25MHz Processor
- Super VGA 9" Trackpoint Mouse
- 64 MB RAM Standard
- 4MB RAM Upgradable to 16MB
- Expansion Storage & Support

SOUND CARDS & SPEAKERS

ADVANCED GRAVIS Ultrasound	125
ALTEC LANSING Speakers	**...ALL MODELS...CALL**
CREATIVE LABS Soundblaster 16 MCD w/ ASP	157/186
CREATIVE LABS Soundblaster 16 SCSI w/ ASP	178/208
CREATIVE LABS Sound Blaster Deluxe	75
DYNAMIC Sonic Sound	213
LABTECH Speakers	ALL MODELS CALL
MEDIA MAGIC ISP16/DSP16- SCSI.	**99/239**
MEDIAVISION Pro Audio Spectrum 16	249
MEDIAVISION Pro Audio Studio 16/XL	**198/317**
MICROSOFT Sound System	124
TURTLE BEACH Multisound	495

GH VISION SYSTEMS

Call For Quotes On Custom Configurations
We Build Systems To Your Specifications

- 386SX/40MHz Processor
- 210MB HD & 2MB RAM
- 14" Monster VGA Monitor & Card
- MS DOS, Windows 3.1 & Mouse

$749

MODEMS

ATI 2400 EIC Int/Ext	69/95
BOCA 14.4 w/FAX Int/Ext	**118/148**
CARDINAL 2400 Int/Ext	41/75
INTEL SatisFAXtion 100 300/400 Int	98/235/279
MEGAHERTZ Modems For Notebooks ..ALL MODELS	
HAYES PERIPHERALS Pocket 14.4 w/FAX	338
HAYES PERIPHERALS 14.4 w/FAX Int	182
HAYES PERIPHERALS 14.4 w/FAX Mini Tower	208
SUPRA 24/96 w/FAX Int	51
SUPRA 14.4 w/FAX Int	**139**
TEMPUS Cellular Portative	295
SUPRA 12/24 Wordport 24/96 w/FAX Port	219
SUPRA Sprinter 96 w/FAX Int Ext	159/169
SUPRA Sprinter 14.4 w/FAX Int Ext	149/169

BATTERY BACK-UPS

AMERICAN POWER	
Back UPS 250-400/450/600	98/155/185/255
Smart UPS 400/600/900/900XL	**. 275/335/525/1045**
Surge Arrest 7	18
TRIPPLITE	
BC 250-400/500	95/147/177
BC, AVR 600/1250	185/245/445
Omni 450/600/900	248/292/464
Command Console Compact	**49**
Tappower-AC to 12 Volt Adapter	65

CD ROM & MULTIMEDIA

CREATIVE LABS Discover 16 Base Bit	369/415
CREATIVE LABS Edutainment CD 16 Bit	359/439
CREATIVE LABS Omni CD/Digital Edge	289/325
MEDIAVISION Fusion CD 16 Int/Ext/Double	**.388/368/489**
MEDIAVISION Memphis . . . NEW . . .	**715**
MEDIAVISION Pro 16 Multimedia System II	779
MEDIAVISION Pro 16 CD Int w/Pro Studio	669
MITSUMI Double Speed CD ROM w/Kit	**209**
NEC 3XI/3XE/3XP Triple Spin	465/559/CALL
NEC 4X Pro	CALL
TEAC Double Speed CD Rom	**335**
TEXEL Double Speed CD Rom Int/Ext	290/395
TEXEL Home Bundle Internal	**479**
TEXEL Business Bundle Int/Ext	669/759
TOSHIBA XM3401 Int/Ext	**355/459**

GLOBAL CD ROM MULTIMEDIA BUNDLES NOW AVAILABLE!

Complete Multimedia Systems with all the Most Popular CD Drives, Sound Cards, Speakers & Software!

BUNDLES TO MEET YOUR NEEDS & YOUR BUDGET

CALL TODAY FOR PRICING AND DETAILS!

CD SOFTWARE SELL-EBRATION

Call Today For Our Guide To CD ROM Software

MONITORS

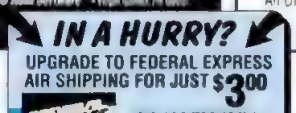
AOC 1[illegible]A14 14"	285/299
CTX 5439 14" 1561 15	218/369
CTX PROSCAN 1760LR 17"	**689**
HITACHI 15"	469/529
MAG MX15F MPRII 15"	399
MAG 17F 17"/21" NEW	**699/NEW**
MAG [illegible] 9089/9089	359/519
MITSI BSH 17" 20S	1015/1589
MONOCHROME MONITORS Amber or White	95
NANAO FS50i . . . NEW LOW PRICE	**999**
NANAO F340iW/FS50iW	**820/1130**
NANAO FS60W F760W	1429/1589
NANAO T660i T660	1668/2399
NEC MULTISYNCS NEW MODELS	IN STOCK
SAMTRON 14 VGA SVGA	209/291
SAMTRON 5[illegible]6 17"	799
SEIKO CM1450/1760	**.417/939**
SONY CPD1430/1730 NEW	595/1029
SONY 17SE 17"	1209
VIEWSONIC V6V7 SVGA 17	360/798
VIEWSONIC 17/21	**989/1895**

NETWORK

NOVELL Netware Lite/ w/16 Bit Eth card	**.....69/139**
NOVELL Netware v3.12 5.10/25 User	569/1259/1689
NOVELL Netware v3.12 50 User	2289/3499
NOVELL Netware v4.01 5.10/25 User	849/1449/2889
"CALL US FOR YOUR NETWARE UPGRADES"	
ARTSOFT AE2 ARCnet cards	149/219
ARTSOFT Ethernet 2 & AE2 Starter Kit	459
ARTSOFT Node Runner	159
BOCA 16 Bit Ethernet Card Coax/TP Combo	**.....78/99**
INTEL EtherExpress 16/16TP	**.....94/94**
INTEL EtherExpress 16 5 Pack	459
INTEL EtherExpress EISA 32 bit	389
SMC Ethercard+ Elite 16/16TP	114/114
SMC Ethercard+ Elite 8 Pack	**.....564**
3COM Etherlink III 5 Pack	515
3COM Etherlink III Coax/TP	**.....119/119**
THOMAS CONRAD TC6242/TC6245	65/175
THOMAS CONRAD 100mbps TCNS 16 Bit	432
XIRCOM Pocket LAN Adapters	**.....CALL**

IN A HURRY?

UPGRADE TO FEDERAL EXPRESS AIR SHIPPING FOR JUST **$3.00**



$3.00 AIR OFFER IS NOT ON ALL ITEMS IT IS ONE TIME HANDLING

SOFTWARE

Microsoft Office 4.0 Upgrade	449
Adobe Pagemaker 5.0	572
CALERA Omnipage Direct	**249**
CORE[illegible]raw 4	385
INTUIT Quicken 2 for Windows	39
LOTUS 1-2-3 5 Windows	289
MICROSOFT Access for Windows	**299**
Microsoft Excel v5.0	299
Microsoft Office for Windows	445
SYMANTEC PC Anywhere v2.5	113
SYMANTEC Norton Utilities	115
WORDPERFECT 6.0 DOS OR WIN	279

WE STOCK UPGRADES FOR MOST SOFTWARE

CALL TODAY

1000'S MORE TITLES AVAILABLE

★ CHECK OUT OUR CD ROM SOFTWARE SELECTION ★

VIDEO BOARDS

ATI Ultra 1MB VLB	89
ATI Graphics Ultra Plus 1MB/2MB	208/227
ATI Graphics Ultra Pro 1MB/2MB	319/348
BOCA Supervga 512K	69
CARDINAL VGA 1MB+ 8Bit	55/129
DIAMOND Stealth 24 ISA/VLB	154/154
DIAMOND Stealth Pro/Viper VLB 2MB	**.....327/384**
HERCULES Graphite 210	218
HERCULES Dynamite VL for DOS	**.....159**
NUMBER 9 GXE Level 10/11/12/14	235/347/427/625
NUMBER 9 GXI TC Level 29	**1349**

SCANNERS & MICE

HEWLETT PACKARD Scanjet 2P/2CX	**720/949**
LOGITECH Scanman 256 w Autostitch	169
LOGITECH Scanman 32 w/Catchword OCR	**129**
MICROTEK Scanmaker IIHSE	625/979
MICROTEK Scanmaker IIG/IISP . . . NEW	**.459/749**
Mustek Color Artist Pro w OCR handheld	349
DEXXA 3 Button Serial Mouse	**23**
LOGITECH Mouseman/Cordless II	69.95
MICROSOFT Serial Bal[illegible]	72/108
IDENTITY Serial Mouse w/pad & pocket	29

PRINTERS

HEWLETT PACKARD – *IN STOCK*

LaserJet 4/4M 4P	**1385/1919/975**
LaserJet 4 4M 4MP	625/1099/1369
LaserJet 4SI 4SI MX NEW	**1799/1449**
DeskJet 500C 550C	369/459
DeskJet 510 520	299/369
DeskJet 540C Postscript	1389/1619
Paintjet XL300	559
Fax-Jet 410	989/1229
TEXAS INSTRUMENTS	
MicroMarc MicroWriter PS23 PS65	259/679/927
MicroLaser Pro 600 PS23/PS65	**1327/1539**
CANON	
BJ-10EX BJ10SX	239/259
BJ-200 210 600/820	285/394/589/[illegible]
NEC LASERS ALL MODELS	**CALL**
OKIDATA	
ML 380 390+ 391+	298/419/419/567
OL 400E/410E 830+ 850	509/679/1089/1245
PANASONIC	
KXP 1[illegible]23 2123 2124	169/209/239/329
KXP 11[illegible]1624 1654	259/[illegible]
KXP 4410 4430 4450 4450i	569/699/1149/1[illegible]

We also carry a **HUGE** inventory of the latest printers for:

EPSON • CITIZEN • QMS • SEIKO

PANASONIC • OKIDATA • STAR MICRONICS

Call for our low price today!
We have what you're looking for!

BUNDLE UP!!! & SAVE WITH THESE TOP SELLING CD'S

REFERENCE BUNDLE
- COMPTONS INTERACTIVE ENCYCLOPEDIA
- WEBSTER'S REFERENCE LIBRARY
- U.S. ATLAS
- WORLD ATLAS

FAMILY BUNDLE
- U.S. & WORLD ATLAS
- CHESSMASTER 3000
- SAN DIEGO ZOO: THE ANIMALS
- MAVIS BEACON TYPING
- GROLIER'S MM ENCYCLOPEDIA

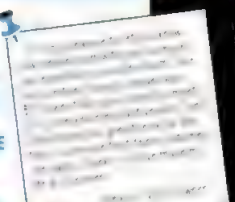
GAMES BUNDLE
- STAR WARS CHESS
- KING'S QUEST V
- ROGER WILCO: SPACE QUEST IV
- LOOM
- MONKEY ISLAND

KIDS BUNDLE
- JUST GRANOMA & ME
- BEAUTY AND THE BEAST
- BARNEY BEAR GOES TO SCHOOL
- MIXED UP MOTHER GOOSE
- LET'S PLAY

$99 PER BUNDLE!

WE OFFER YOU

- QUALITY PRODUCTS
- HUGE INVENTORY
- KNOWLEDGEABLE SALES STAFF
- RELIABLE SERVICE
- FAST DELIVERY
- EXPERIENCED TECHNICAL STAFF



International Orders Welcome

1-800-860-4562
(1-800-860-GLOBE)

VISA DISCOVER MasterCard

FAXBACK SERVICE
(708) 949-9372
Send Your Fax Today!
All Quotes Answered IMMEDIATELY!

Women Owned Business

Global Horizons, Inc.

1051 E. High Street ◦ P.O. Box 644 ◦ Mundelein, IL 60060

HOURS CST: 7:00 a.m.-7:00 p.m.– Monday-Friday • 8:00 a.m.-2:00 p.m. –Saturday

HUGE INVENTORY– WE HAVE WHAT YOU'RE LOOKING FOR!! Most orders ship within 24 hours. We accept VISA, Master Card, Discover, Wire Transfers and C.O.D.'s. Terms available – Immediate credit approval. Credit cards not charged until products ship. Prices and availability subject to change without notice.

CALL TODAY FOR OUR "SPOTLIGHT ON SAVINGS" CATALOG!!

Outside Illinois 1-800-860-4562
Inside Illinois (708) 949-9332
Shipping & Technical Assistance (708) 949-9369
CIRCLE 277 ON READER SERVICE CARD

Best Products. Best Prices.

30 PIN SIMMs

1x3 - 70	$ 42
1x9 - 70	$ 50
4x9 - 70	$155
16x9 - 70	$729

72 PIN SIMMs

(1 mb) 256 x 36	$ 59
(2 mb) 512 x 36	$ 89
(4 mb) 1 x 36	$189
(8 mb) 2 x 36	$369
(16 mb) 4 x 36	$639

Expansion Boards

Aculogic

RAMpAT Plus™ $109
2-16 mb Expansion Board for 286 and 386 IBM-compatible machines

Simmply Ram/16™ $145
1-32 mb Expansion Board for P/2 models 50 and 60

Simmply Ram/32™ $145
1-64 mb Expansion Board for P/2 models 70 and 80

EISA Ram™ $189
1-128 mb Expansion Board for EISA Bus systems

Laser Printer Memory

Hewlett Packard Laser Jet IIIsi, 4, 4M, 4si, 4siMX & XL300	4mb	$189
	8mb	$369
Hewlett Packard Laser Jet IIP, III, IIIP, IIID	2mb	$109
	4mb	$179
Hewlett Packard Laser Jet II, IID	2mb	$129
	4mb	$269
IBM 4019, 4019e	2mb	$116
	3.5mb	$179
IBM 4029	2mb	$ 89
	4mb	$179
Epson EPL 6000	2mb	$129
	4mb	$229
Oki Laser 800, 820	2mb	$129
	4mb	$219
Panasonic 4410 & 4430	2mb	$129
	4mb	$199
Panasonic 4450i & 4420	2mb	$129
	4mb	$199

Laptop and Notebook Memory

AST

Premium Exec 286, 386SX/20, 25, 25C	4mb	$179
Power Exec 4/25 SL	4mb	$199
Power Exec 3/25SL, 3/25SLC, EL	4mb	$199
	16mb	$879

COMPAQ

Contura 3/20, 3/25, 3/25C	4mb	$172
	8mb	$306
Contura 4/25 Series	4mb	$181
	8mb	$344
LTE 286	2mb	$113
	4mb	$195
LTE 386s/20	4mb	$199
LTE Lite 20, 25, 25c, 25e	4mb	$239
	8mb	$389
LTE Lite 4/25c	4mb	$211
	8mb	$367
SLT 386s/20	4mb	$205

IBM

ThinkPad 350, 350c	8mb	$349
	16mb	$749
ThinkPad 700,720 series	8mb	$402
PS/2 CL57SX,	4mb	$212
ThinkPad 750 series	4mb	$239
	8mb	$429
	16mb	$969
L40SX, PS/Note 182, N33SX	2mb	$109
	4mb	$195
	8mb	$329

AST

Premmia	8mb	$ 379
	16mb	$ 739
Bravo 3/25s	2mb	$ 110
	8mb	$ 316
Bravo 3/33s	2mb	$ 89
	8mb	$ 282
Bravo LC/25s, 4/33, 4/33s, 4/50d, 4/66d	4mb	$ 169
	16mb	$ 719
AdvantagePro486/50/33 Pro486/50/25	4mb	$ 169
	16mb	$ 719
AdvantagePro 386 SX/25	4mb	$ 89
	8mb	$ 282

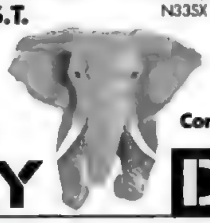
CALL ON ALL IBM MEMORY!
We'll beat any advertised price!!

COMPAQ

DeskPro 386-20, 20e & 25	4mb	$ 199
DeskPro 386s/16	4mb	$ 199
ProSignia PC Server 486/33 DX 2/66, SystemPro LT Series, M, N and I Series	1mb	$ 59
	2mb	$ 89
	4mb	$ 189
	8mb	$ 369
DeskPro 386-33, 486-33 & System Pro	2mb	$ 92
	8mb	$ 369
ProLinea 3/25s, 3/25zs	2mb	$ 95
	8mb	$ 319
ProLinea 4/25s, 4/33, 4/50, 4/66	1mb	$ 59
	2mb	$ 89
	4mb	$ 189
	8mb	$ 369

7921 Professional Cir.,
Huntington Beach, CA 92648

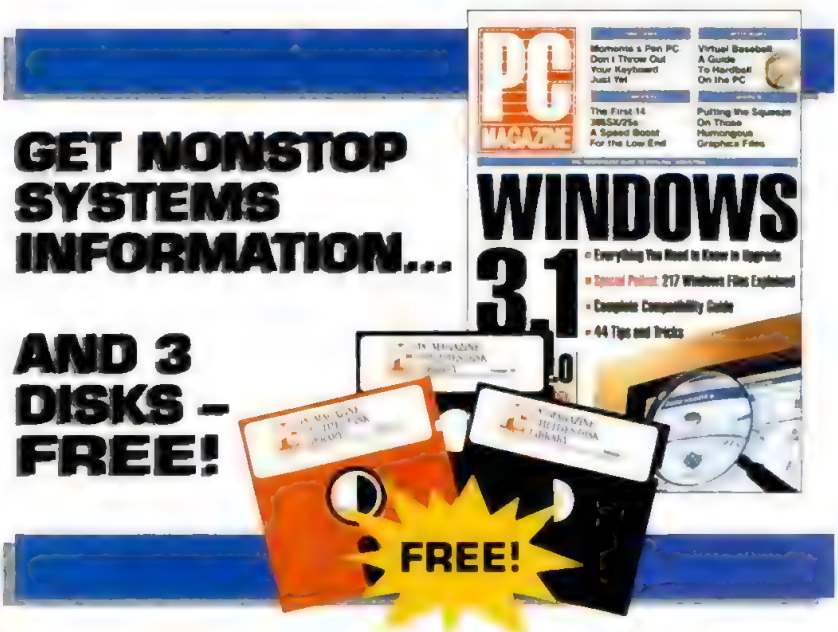
Office 714-848-5958
Fax 714-842-9437
7AM TO 5PM MONDAY THRU FRIDAY P.S.T.



Same Day Shipping
P.O.'s, Educational P.O.'s, Corporate P.O.'s, Government

800-588-6348
MEMORY DIRECT!

CIRCLE 383 ON READER SERVICE CARD



GET NONSTOP SYSTEMS INFORMATION...

AND 3 DISKS – FREE!

Subscribe to PC Magazine today. You'll get 22 issues for only $29.97 — that's 54% off the $64.90 cover price! Better yet, sign up for two years and get 44 issues for just $49.97 — a savings of 62%!

Order now and you'll also get **PC Magazine's *"Utilities Disk Library"* on 3 disks — FREE** with your paid subscription! These 103 utilities, selected especially for new subscribers by the editors of PC Magazine, let you upgrade your system, boost your PC power, and simplify tasks — all at just the touch of a key!

ONE YEAR
(22 issues) for $29.97.
YOU SAVE 54%!

TWO YEARS
(44 issues) for $49.97.
YOU SAVE 62%!

Call toll-free today:
1-800-289-0429

Basic one-year subscription $44.97; on newsstands $64.90. Canada and foreign add $32.00 per year. U.S. funds only. Canadian GST included. Please allow 30 days for shipment of first issue. FREE disks will be sent upon payment.

MAIN STREET COMPUTER COMPANY'S

NETWORK EXPRESS

CONNECT WITH US

NOVELL SOFTWARE

NetWare V3.12 5 User $599

Novell 3.12 5/10 User	599/1,369
Novell 3.12 25/50 User	1,899/2,559
Novell 3.12 100/250 User	3,509/Call

NetWare V4.01 5 User $879

Novell 4.01 5/10 User	879/1969
Novell 4.01 25/50 User	2,995/3,799
Novell 4.01 100/250 User	5,399/9,998
Novell 4.01 500/1000 User	16,834/30,609
NetWare Encyclopedia Special	495
Novell NFS/386 NLM	3,499
Novell Personal NetWare 1/5 User	75/299
LAN Workplace for DOS	319

Upgrade Your Existing Novell To a Newer Version or Add Users & Save ! Call For Details.

TAPE DRIVES

ADIC Data 8000i 8GB Internal	1,895
ADIC Data 8000e 8GB External	2,059
ADIC Data 8000 Novell Software	250
ADIC DAT Tape Cartridges	25
ADIC ISA SCSI Adapter	250

$795 Internal Kit

$1,049 External Kit

WIDE • AREA NETWORKING

$1,399

BRIDGES/ROUTERS

D-Link 1100 Local Bridge	1,679
D-Link 1140 Remote Bridge	2,949
D-Link 1120 Remote Bridge	1,659
DeveCon 120i 2 port Local Bridge	1,495
DeveCon 102 + 1X Dual Link Remote Bridge	3,189
Intersecon Quicknet	2,949
Intersecon Quicknet 6000 Bridge	997
Intersecon Quicknet	2,949
Novell Multiprotocol Router	729
Retix 3660 Local Token Ring Bridge	4,899
Retix 3680 Remote Token Ring Bridge	5,399
Retix 4760 Local Ethernet Bridge/Router	2,249

CSU/DSU

Astrocom 2300 Variable Speed CSU/DSU	649
Astrocom NX1 T1 CSU/DSU	1,495
Penril 56K CSU/DSU	399
Penril 56 96 CSU/DSU	475
Penril T1 CSU/DSU	1,679

NETWORK UTILITIES

Cheyenne Utilities for Netware **$269**

Brightwork LAN Support Center	439
Brightwork Utilities for NetWare	379
Central Point Antivirus NLM	1,750
Central Point Antivirus NLM 1.1	899
Corel SCSI Driver	79
Cheyenne inocuLAN NLM 20/250 User	329/659
Cheyenne Utilities for NetWare	269
Intel LanDesk	739
Intel LanDesk Manager	739
Inocolan NLM 20 User	339
Novell Computer Based Training Net Technology	679
Novell Computer Based Training Intro to Networking	219
Saber LanPack 10/25/100 User	279/495/1769
Xtree Tools for NetWare	549

FREE NETWARE® INSTALLATION As a special service to purchasers of Novell Networks®, we are pleased to offer expert installation of your software by our Certified Netware Engineers (CNE). Just purchase a file server and Netware® from us, and we'll do the rest GETTING WHAT YOU WANT! The above configurations are examples of outstanding values available when this advertisement was constructed. It is very likely that your requirements will differ. These items that represent the best value may have also changed. Please call us for a price on your requirements. Get exactly what you want at the same low pricing level.

NOVELL COMPATIBLE LAN EQUIPMENT

$989 386 21MHz ***40Mhz***
- 1MB RAM
- 16 Bit Ethernet Adapter
- 210 MB HD
- Choice of 1.2 or 1.44MB FDD
- .28MM SVGA Color Monitor
- 1MB SVGA Adapter

$1199 486 33SX ***210MB SVGA***
- 4MB Ram
- 16 Bit Ethernet Adapter
- 210 MB HD
- Choice of 1.2 or 1.44MB FDD
- .28MM SVGA Color Monitor

$1499 486 DX ***33Mhz LOCAL BUS***
- 4MB Ram
- 16 Bit Ethernet Adapter
- 250 MB HD-VL-BUS
- Choice of 1.2 or 1.44MB FDD
- .28MM SVGA Color Monitor
- VL-BUS 1MB SVGA Adapter

$2079 486 DX ***66Mhz LOCAL BUS***
- 8MB Ram
- 16 Bit Ethernet Adapter
- 420 MB HD-VL-BUS
- Choice of 1.2 or 1.44MB FDD
- .28MM SVGA Color Monitor
- VL-BUS 1MB SVGA Adapter

WE'RE YOUR NETWORKING SOURCE

WORKSTATIONS & FILE SERVERS

$1299 ***486DX 33Mhz***
- 4MB RAM
- 64K RAM Cache
- 16 Bit Ethernet Adapter
- 340 MB HD
- Choice of 1.2 or 1.44MB FDD
- Monochrome VGA Monitor

$1995 486 ***DX2 66Mhz VL-LOCAL BUS***
- 8MB RAM
- 256K RAM Cache
- 16 Bit Ethernet Adapter
- 520 MB HD
- Choice of 1.2 or 1.44MB FDD
- Monochrome VGA Monitor
- IDE VL BUS Adapter

$3899 486 EISA 50Mhz

- 16MB RAM
- 256K Cache
- EISA SCSI Adapter
- 1.0 GB SCSI HD
- Both 1.2 & 1.44MB FDD
- Monochrome VGA Monitor
- VGA Video Adapter
- 300 Watt Power Supply
- Novell Compatible

$4789 ***Pentium File Server***
- 16MB RAM
- 256K RAM Cache
- 16 Bit Ethernet Adapter
- 1.6 GB HD
- 1.44MB FDD
- Monochrome VGA Monitor

10 BASE T PRODUCTS

16 + 2 PORT 10 BaseT HUB
- 16 - 10 BaseT Ports
- 1 - Coax Port
- 1 - AUI Port
- 26 - LINK/Rx LED's
- IEEE 802.3 Ethernet Compliant Repeater

$499

8 PORT **$229**

HUBS

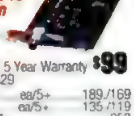
Asante 8 Port 10 BaseT Hub	269
Boca 8 Port 10 BaseT Hub	229
Canary 24 Port 10 BaseT Hub	899
3COM LinkBuilder 12 Port 10 BaseT	729
David Systems JoltXpnet 12 Port	549
D Link DE200G SNMP 12 Port	1,179
Gateway 8 Port Hub	339
HP EtherTwist 8 10/24/Port	389/849/2,119
Intellicom 12 Port SNMP Hub	1,049
NetExpress 12 Port 10 BaseT Hub	395
SMC Elite 16C8 8 Port	369
Synoptics 2800 A 10 BaseT	769
Thomas Conrad 8 Port	379
TTC 6 Port Internal 10 BaseT Hub	199

CABLING

10 BaseT Cable Assy 10' 25'	10/15
10 BaseT Cable Assy 50' 100'	25/35
10 BaseT Cable Spool 1000'	129
10 BaseT Cable Type 3 Plenum	49¢/ft
10 BaseT Cable Type 5 10' 25'	20/30
10 BaseT Cable Type 5 50' 100'	50/75
10 BaseT Cable Type 5 1000'	289
RJ45 Crimping Tool	29
RJ45 Connectors	75¢ ea
RJ45 Dual Wall Plate Dual	5.00

ADAPTERS

ALTA 16 BIT BNC & 10 BaseT Combination Adapter



- ALTA 2000 Novell Certified Compatible
- 2 LED Indicators • 5 Year Warranty
- Novell BOOT ROM $29

$99

3 COM 3C503 16 TP ea/5+	189/169
3 COM 3C509 TP ea/5+	135/119
3 COM 3C579 -TP EISA	259
ACCTON 16 bit 10 BaseT ea/5+	119/89
ALTA 16 bit 10 BaseT ea/5+	89/79
D LINK PCMCIA Ethernet 10 BaseT	219
D LINK Pocket Ethernet 10 BaseT	199
Eagle Anthem NE2000T + ea/5+	99/89
Eagle Anthem NE2001 PCMCIA	219
Gateway Ethertwist 16 10 BaseT 32 bit EISA	529
HP Ethertwist 16 10 BaseT ea/6+	109/99
IBM Ethernet 10 BaseT Adapter ea/6+	109/99
IBM PCMCIA Ethernet 10 BaseT	279
Inter EtherExpress 16 10 BaseT	115
KODIAK Noteport 10 BaseT	269
SMC Ethercard Elite 16 T Ultra ea/6+	115/107
SMC WD Ethernet + Elite ea/6+	129/119
SMC Elite 10 T A Microchannel	199
Thomas Conrad PCMCIA 10 BaseT	289
XIRCOM Pocket Ethernet 10 BaseT	299

• Whether this is your first experience at networking or you are a certified engineer, the professionals at Network Express are ready to help. Call or FAX us your requirements. • Over 15,000 proven NETWORK PRODUCTS from more than 200 manufacturers. • Novell, IBM, and Artisoft trained sales consultants to serve you. • This list of products represents a small portion of the selection available. Please call for any networking needs - we'll try to help. • If you need assistance determining the best way to solve your networking challenge, give us a call or better yet, take advantage of our NOT FAX number by faxing us your situation, bid request, diagram, or purchase order. We will provide you with an accurate and timely response.

REPEATERS

TUT SYSTEMS 2 PORT REPEATER **$299**

3Com Linkbuilder 10 Port Repeater	1,619
3Com 8 Port Fiber Optic Repeater	1,699
Canary BNC / FO Repeater	569
IMC PCNIC Basket PLUS	649
TUT Systems 2 Port Repeater	299
TUT Systems 4 Port Repeater	499
TUT Systems 8 Port Repeater	829

TRANSCEIVERS

AUI to BNC or AUI to RJ45 **$69**

AUI to BNC Transceiver	69
AUI to 10 BaseT Transceiver	69
Canary BNC / FO Transceiver	599
IMC Fiber Optic Transceiver	219

TEST EQUIPMENT

MT350 Value Kit

Advanced Cable Certification for UTP STP and Coax Supports Ethernet, Token Ring & ARCNET

$1,979

Accutek 10BT Continuity + Polarity Tester	129
Cable Continuity Tester BNC	39
Fluke Lan Test Equipment	CALL
MicroTest Quick Scanner Kit	629
MicroTest Ring Cable Test Kit	995
Novell Lanalyzer for Windows	995
Time Domain Reflectometer	579

PRINT SERVERS

NETWORK EXPRESS PRINTMATE 3 **$399**

- 2 Parallel Ports
- 1 Serial Port
- BNC AUI & RJ45 Connections
- Simple Installation
- 2 Year Warranty

Castelle Lanpress 2P2S	525
Castelle Lanpress 2P2S BNC or RJ45	525
Intel Netport Print Server	439
Intel Netport Print Server BNC or RJ45	439
MIO Print Server LJIII LJ4 LJ4si	449

POWER BACKUP

Smart UPS 600 File-Server Backup Retail $599

$389

AMERICAN POWER 220 VOLT

BackUPS 250i/400i/600i	189/229/299
BackUPS 900i/1250i	489/629
SmartUPS 250/600/900i	279/429/659
SmartUPS 1250i/2000i	879/1,379

TRIPP LITE 120 VOLT

BC 250/400/500	109/169/199
BC 500 LAN/600 LAN	229/269
BC 750 LAN/1250 LAN	329/499
Isobar Ultra 4/6/8	49/59/69
0600-1200-1800	79/149/209
Power Miser 4 Outlet	49

Equipment Warranted up to $25,000. by Manufacturers - Details Available

SCSI HARD DRIVES

1 Gigabyte SCSI Hard Drive Fujitsu M2694 ESA

$1,099

CONNER

CP30540	546MB	10ms		659
CP31370	1.37GB	10ms		1,179

FUJITSU

5 Year Manufacturer Warranty

M2624FA	520MB	12ms	3.5"	609
M2266SA	1GB	15ms	5.25"	1,296

Maxtor

Panther PO-12S	1.0GB	13ms		1,049
MTX 1240S	1.24GB	8.5ms		1,399

Seagate

ST 11200 N	1.4GB	14.5ms	5.25"	995
ST 41651 N	1.4GB	14.5ms	5.25"	1,199
ST 42100 N	1.4GB	14.5ms	5.25"	1,549
ST 42400 N	1.4GB	14.5ms	5.25"	1,859
ST 43400 N	1.4GB	14.5ms	5.25"	2,479

MICROPOLIS

MC 1624HS	668MB	16ms	5.25"HH	779
MC 2210	1.0GB	10ms	3.25"	1,029
MC 2217	1.7GB	10ms	3.25"	1,379
MC 1924	2.1GB	12ms	5.25"	1,799
MC1936	3.0GB	12ms	5.25"	2,529

MICROPOLIS

RAIDION LT

Micropolis Raidion LT 1120 **$4,339**

RAID ARRAYS

Micropolis Raidion LT 2100	4,975
Micropolis 6040	13,412

MICRODISK

Super Capacity External Storage

Microdisk 670	667MB	15ms	1,499
Microdisk 1030	1.03MB	14.5ms	1,669
Microdisk 1340	1.34MB	14.5ms	1,750
Microdisk 1750	1.74MB	14ms	2,399
Microdisk 2100	2.10MB	11.5ms	2,569
Microdisk 3020	3.02MB	12ms	2,960
Microdisk PC Kit			75
Microdisk Mac Kit			90

ARCNET PRODUCTS

$59

Network Express Policies...

$349 ***IT'S YOUR CHOICE!***

ARTISOFT LANTASTIC • PERSONAL NETWARE

NETWORKING BREAKTHROUGH!

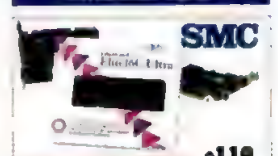
COMPLETE 2 STATION 10MBS ETHERNET STARTER KIT INCLUDES:

MAKES THE DIFFERENCE! START AREA

THE RIGHT CHOICE

After evaluating dozens of network interface cards, the engineers at ... selected this high quality combination Ethernet Adapter for inclusion in our starter kit.

ETHERNET COAX



Ethercard Elite 16C Ultra **$119**

QTY 6+ **$109**

ADAPTERS

3COM 3C507 Etherlink 16 BNC ea/5+	319/279
3COM 3C503 Etherlink II BNC ea/5+	179/159
3COM 3C509 Etherlink III ea/5+	129/119
3COM 3C579 EISA 32 Bit	259
Artisoft NodeRunner SI Adapter BNC ea/6+	109/99
Alta BNC/RJ45 16 Bit 4 LED	99
Eagle Anthem NE2000 PLUS BNC ea/5+	115/99
IBM Ethernet BNC Adapter	CALL
Intel Ether Express 16 BNC	115
Kodiak Noteport BNC + 10BT	269
NE 2000 Compatible Certified	79
NE PE 300B Pocket Ethernet BNC ea/3+	199/169
SMC Ethercard + Elite 16 BNC ea/6+	129/119
SMC Ethercard + Elite 16 Qty 6+	119
SMC Elite a Coax Micro Channel	199
SMC EISA Dual Port BNC	679
Xircom Pocket Adapter BNC	299

CABLING

BNC Crimp Style Connectors	3.00
BNC Dual Wall Plate	7.50
BNC Twist On Connectors	3.75
BNC T-Connectors	4.00
BNC 52 Ohm Terminators	3.00
BNC 52 Ohm Terminators-Grounding	10
BNC Crimping Tool	29
Ethernet Thinnet Coaxial Cable 25' Assy	15
Ethernet Thinnet Coaxial Cable 50' Assy	25
Ethernet Thinnet Coaxial Cable 100' Assy	35
Ethernet Thinnet Coaxial Cable 500' Assy	129
Ethernet Thinnet Coaxial Cable 1000' Assy	199
RG58 A/U Coax Cable	30¢ ft.
RG58 A/U Coax Cable Plenum Jacket	60¢ ft.

REPEATERS HUBS

3COM Linkbuilder 10 Port BNC Repeater	1,619
Canary BNC to Fiber Optic Repeater	599
TUT Systems Quad Port Repeater	499
TUT Systems Dual Port Repeater	299

TOKEN RING

SMC TOKEN RING CARD ELITE ISA/MCA **$279**

ADAPTERS

3COM TokenLink III 16/4 ISA/MCA	439/475
Accton Pocket Token Ring	439
Accton Ring Adapter MCA 16/4	379
IBM 4 MBS Token Ring	295
IBM 16/4 Token Ring ISA/MCA	549
Olicom 16/4 Token Adpt ISA/MCA	349/369
PROTEON 16/4 Token Ring Adpt ISA/MCA	439/439
PROTEON EISA BusMaster 16/4	499
SMC Tokencard Elite ISA /MCA	279
Thomas Conrad 16/4 ISA /MCA	379/439

MAU

3COM Superbundle MAU + 5 Adapters	3,995
Accton RingHub 300 8 Port MAU	329
C NET 8 Port Token Ring MAU Type 1	369
C NET 8 Port Token Ring MAU Type 3	309
IBM 8228 MAU Multi Access Unit	469
Olicom 8 Port UP T MAU	369
SMC Token Ring Elite MAU 8 Port	419
SMC Token Ring Elite MAU 16 Port	609
Thomas Conrad Token Ring RJ45 MAU	695

Novell, Netware and "N" are trademarks of Novell. All other brand names are trademarks of their respective companies. Smart people read the fine print and they do business with Network Express.©

Discover, VISA, MasterCard, Diners Club, American Express, Carte Blanche Accepted. Never A Surcharge.

Business Hours (EST) M-F - 8:45 am - 10pm Sat. 9 am - 1pm

Address: 1675 Hampton Blvd. Sarasota, FL 34234

NETWORK EXPRESS

AD CODE E34X

1-800-753-9899

24 HOUR TOLL FREE FAX

1-800-333-5841 FAX

VOICE 1-813-359-2876 - FAX 1-813-355-5841

CIRCLE 878 ON READER SERVICE CARD

WE DARE YOU TO COMPARE !

THE SOURCE FOR STORAGE SOLUTIONS!

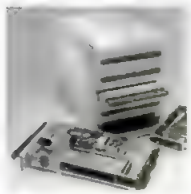
DRIVE PRICES GO DOWN - CALL FOR CURRENT PRICES

30 DAY MONEY BACK GUARANTEE!
CUSTOMIZED SOLUTIONS!
WIDEST SELECTIONS!
TOLL-FREE TECH SUPPORT!

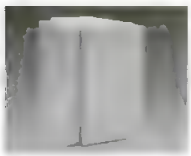
STORAGE SOLUTIONS FOR ANY COMPUTER SYSTEM ON ANY OPERATING SYSTEM.

STORAGE SYBSYSTEMS

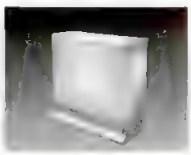
We can custom configure any subsystem from 100MB to Terabyte - Call for prices



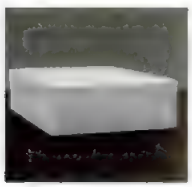
5 OR 7 3.5" DRIVES, REMOVABLE, HOT SWAPSUBSYSTEM



MICROPOLIS RAIDION UP TO 93 GB RAID SOLUTIONS FOR OS/2, NOVELL, UNIX, AND MACINTOSH



TOWER SUBSYSTEM 8 FULL HEIGHT OR 16 3.5" DRIVE SOLUTION



3.5 DISK SUBSYSTEM

SEAGATE — **2YR & *5YR WARRANTY

TYPE	MB	SIZE	SEEK	PRICE
SCSI				
ST3390N	341	1"	12	$ 333
ST3550N	456	1"	12	$ 493
ST3655N	545	1"	11	$ 526
ST4767N	665	FH	12	$ 908
ST41200N	1037	FH	15	
ST31200N*	1050	1"	9	
ST11200N*	1050	3.5	11	CALL!!
ST41600N	1370	FH	12	
ST41650N	1415	FH	15	PRICES TOO
ST11900N*	1700	3.5	9	
ST11950N*	1700	3.5	8	GOOD TO
ST42100N*	1900	FH	13	
ST12550N*	2145	3.5	8	PRINT
ST12400N*	2100	3.5	9	
ST42400N*	2106	FH	10	
ST43400N*	2912	FH	10	
IDE				
ST3145A	130	1"	16	$ 180
ST3283A	245	1"	12	$ 278
ST3290A**	260	1"	16	$ 224
ST3390A**	341	1"	12	$ 285
ST3550A	452	1"	12	$ 395
ST3655A**	545	1"	12	$ 500

MAXTOR — 2YR WARRANTY

TYPE	MB	SIZE	SEEK	PRICE
SCSI				
7245S	245	1"	15	$ 241
7345S	340	1"	15	$ 343
IDE				
7213A	213	1"	15	$ 217
7245A	245	1"	15	$ 241
7345A	340	1"	14	$ 286

QUANTUM — 2YR WARRANTY

TYPE	MB	SIZE	SEEK	PRICE
LPS270S-A	270	1"	16	$ 242
LPS540S	525	1"	10	$ 439
PD1225S	1225	3.5	10	$ 935
PD1800S	1800	3.5	10	$ 1089

WESTERN DIGITAL — 2YR WARRANTY

TYPE	MB	SIZE	SEEK	PRICE
IDE				
WD1210	200	1"	14	$ 199
WD2250	245	1"	14	$ 223
WD2340	340	1"	13	$ 273
WD2420	420	1"	13	$ 348

FUJITSU — 5YR WARRANTY

TYPE	MB	SIZE	SEEK	PRICE
SCSI				
M2624FA	520	3.5	12	$ 518
M2694	1080	3.5	10	$ 827
M2654S	2061	FH	11	$ 1388
IDE				
M2624T	520	3.5	12	$ 487

MICROPOLIS — 5YR WARRANTY

TYPE	MB	SIZE	SEEK	PRICE
SCSI				
2210	1050	3.5	10	
2217	1750	3.5	10	CALL!!
1926	2100	FH	11.5	
1936	3050	FH	12	PRICES TOO
IDE				
2210A	1035	3.5	10	GOOD TO
2217A	1750	3.5	10	
AUDIO VIDEO				PRINT
2210AV	1050	3.5	10	
2217AV	1750	3.5	10	

DEC — 5YR WARRANTY

TYPE	MB	SIZE	SEEK	PRICE
SCSI				
DSP3107L	1050	1"	9.5	$ 865
DSP3105	1050	3.5	9.5	$ 889
DSP3160	1660	3.5	10	$ 1123
DSP5200	2000	FH	12.5	$ 1142
DSP3210	2100	3.5	10	$ 1493
DSP5350	3500	FH	11.5	$ 2222
DSP5400	4000	FH	12	$ 2474

SPECIALS — 5YR WARRANTY

MB	SIZE	HT	PRICE
1GB	3.5	1"	$ 863
1.7GB	3.5	HH	$1085
2GB	3.5	HH	$1490
3GB	5.25	FH	$1975

CONNER — 1YR WARRANTY

TYPE	MB	SIZE	SEEK	PRICE
IDE				
CFA170A	170	1"	17	$ 191
CP30254	245	1"	14	$ 227
CFA340A	340	1"	14	$ 278
CP30544	540	1"	12	$ 590
SCSI				
CFA17S	170	1"	17	$ 195
CP31370	1370	3.5	10	$ 996

TAPE DRIVES

TYPE	MB	SIZE	SEEK	PRICE
EXABYTE	8200	2.5GB	8MM	$ 1610
EXABYTE	8205	2.5GB	8MM	$ 1505
EXABYTE	8500	5GB	8MM	$ 2355
EXABYTE	8505	5GB	8MM	$ 2165
EXABYTE	8500C	5GB	8MM	$ 2275
WANGDAT	3100	2-4GB	4MM	$ 950
WANGDAT	3200	4-8GB	4MM	$ 1050
WANGDAT	3400	8-16GB	4MM	$ 1145

MULTI MEDIA CD-ROM Bare Drives

TYPE	MS	SIZE	SEEK	PRICE
CHINON CD535	280	2X	256 K cache	$ 320
TOSHIBA 4101	280	-	-	$ 235
TOSHIBA 3401	200	2X	256 K cache	$ 355

HOT CD BUNDLES

$ 100 w/the Purchase of any CD-ROM, $ 125 Separately

ENTERTAINMENT
7th Guest
King's Quest V
Monkey Island
Loom
Jones In the Fast Lane

CHILDRENS
Just Grandma & Me
Mix Up Mother Goose
Interactive CD Storytime Vol. II
Beauty and the Beast
Arthur's Teacher Trouble

EDUCATIONAL
Microsoft Bookshelf for Win.
U S History
Mayo Clinic
Multi Media World Atlas
Mavis Beacon Teaches Typing

MICRONICS GIGABYTE FULL TOWER FILE SERVERS

- 486 DX2 – 66 MHZ VL, EISA
- Pentium upgradable
- 4 gigabyte SCSI II hard drive, 11 MS
- 8 MBs RAM
- 256K cache
- Available drive bays: Five5.25",Two 3.5"
- Six 32 bit EISA slots, Two EISA VL buses
- One EISA SCSI 2 controller
- 1.2" and 1.44" floppy drives
- Class B

CALL FOR CUSTOM CONFIGURATION

$ 4725

1-800-989-3475

S·A·G ELECTRONICS

867 TURNPIKE, NORTH ANDOVER, MA 01845
TEL (508)682-0055 • FAX (508)689-0180
OFFICES: MASSACHUSETTS & PENNSYLVANIA

Returns may be subject to restocking fee. RMA# must be acquired

S·A·G expert technicians and knowledgeable sales personnel have been providing hard drives and storage systems to the international computer service industry since 1987. We have been satisfying the technical demands and needs of people who replace and upgrade computer systems for major corporations worldwide

PRODUCT: We carry a full line of all storage proucts. Call for any product
PRICE: Volume discounts available
Call for current prices
TECH SUPPORT: Toll-free Mon - Fri 9AM - 6 PM Eastern Standard Time

DELIVERY: We offer immediate delivery and have a 92% rate of shipping the same day.
PAYMENT: VISA, MasterCard, Corporate, Government and Educational purchase orders are welcome No Surcharge For VISA, MC, or CODs.

CIRCLE 309 ON READER SERVICE CARD

WE WILL TRY TO MATCH OR BEAT ANY ADVERTISED PRICE. CALL FOR LATEST PRICING!!

WE ACCEPT PO'S FROM QUALIFIED FIRMS

M E M O R Y

NO SURCHARGE FOR MC, VISA AE & DISCOVER

CACHE MEMORY

	12NS	15NS	20NS	25NS
8Kx8	–	6.50	6.00	5.50
32Kx8	28.00	9.00	8.00	7.00
64Kx1	–	11.00	9.00	8.00
64Kx4	–	11.00	9.00	8.00
16Kx4	–	8.00	7.00	6.00
128Kx8	–	–	49.00	36.00

Individual D-RAM Chips

MEMORY FOR IBM & APPLE	80NS	70NS	60NS	100NS
1Megx1	7.35	7.25	6.75	4.95
1Megx4	35.00	29.00	27.00	–
1Megx4 (Zip Pack)	27.00	25.00	23.00	–
256 x 4 (Video Zip)	–	–	11.95	10.95
256x4	7.95	6.95	–	–
256 x1	3.00	2.75	2.50	2.25
256 x16VRAM	–	39.00	39.00	–
64x4	–	–	3.25	–
64x1	–	–	–	2.00

INTEL Math Chips

8087	45.00
8087-2	49.00
8087-1	85.00
80287-XL	55.00
80387-16 DX	45.00
80387-20 DX	55.00
80387-DX (Does Alt)	79.00
80487-SX (Does Alt)	309.00
Intel SX (Does Alt)	79.00
Intel SL Model	85.00
Intel 16SX	49.00
Intel 20SX	54.00

AMBRA

Ambra Pentium-90	4/8/16 Meg	CALL
Ambra 5454DSL	4/16 Meg Kit	CALL
Ambra Spretta 386, Hurdle 386SX, Enterprise 386 Slim	2/8 Meg Kit	CALL
Ambra Spretta, Hurdle & Enterprise 486	4/16 Meg Kit	CALL
Ambra NC 425SL	2/4/8 Meg	109.00/209.00/449.00
Ambra N Series	4/8/12/16 Meg	189.00/379.00/569.00/829.00
Ambra SN Series	4/16 Meg	189.00/829.00

CYRIX DRx² 386 to 486 Upgrade
Clock Doubler

- Single chip upgrade solution
- Clock doubling technology
- Compatible with industry standard 386SX CPU socket
- Compatible with DOS, Windows, 3.X, OS/2 1.3 and 2.x
- Uses industry standard math chip
- Easy to install—about 15 minutes

The Cyrix upgrade runs at twice the speed of your original 386 microprocessor combined with a 1K on-chip cache you will enjoy a performance boost of 100% and more. Ideal for any DOS, Windows or OS/2 application which requires a large amount of microprocessor horsepower

CX486 DRx²-16/32	...259.00
CX486 DRx²-20/40	...299.00
CX486 DRx²-25/50	...359.00
CX486 DRx²-33/66	...CALL
CX486 SRX2 16/32	...249.00
CX486 SRX2 20/40	...249.00
CX486 SRX2 25/50	...279.00

SIMM MODULES (Add $5.00 for SIPP)

	40NS	50NS	60NS	70NS	80NS	100NS
1Meg x 9 (3 chip)	55.00	55.00	42.00	41.00	40.00	–
1Meg x 9 (9 chip)	60.00	59.00	49.00	48.00	46.00	38.00
4Meg x 9	–	–	165.00	159.00	149.00	–
16Meg x 9 (9 chip)	–	–	–	799.00	–	–
16Meg x 9 (36 chip)	–	–	–	–	–	–

72 PIN SIMMS (EISA)

256 x 36 1Meg	–	–	–	–	59.00	–
512 x 36 2Meg	–	–	–	89.00	84.00	–
1 x 36 4Meg	–	–	190.00	180.00	175.00	–
2 x 36 8Meg (w/par)	–	–	369.00	359.00	349.00	–
2 x 36 8Meg (w/o par)	–	–	359.00	349.00	339.00	–
4 x 36 16Meg	–	–	689.00	649.00	649.00	–
8 x 36 32Meg	–	–	1549.00	1499.00	–	–
16 x 36 64Meg	–	–	CALL	3518.00	–	–

CYRIX FASMATH PROCESSOR

Programs executed up to 3X faster • Plug & object code compat. w/Intel

83D87-40MHz - 89.00 | 83D87-33MHz - 89.00 | 83S87-25SX Ver. - 89.00

83S87-33SX - 89.00 — PC Week™ rated #1 over all math chips

5 Year Warranty - "All Downward Compatible"

AST MEMORY

MODEL	AMT. UPGRADED	AST PART #	PRICE
Bravo LC 4/25S, 4/33, 4/33S, 4/50S, 4/66S	2Meg	500987-001	CALL
	4Meg	500987-002	179.00
	8Meg	500987-003	419.00
	16Meg	500987-004	619.00
	32Meg	500987-005	1399.00
Premium 486/25, 25S, 33, 33S			
Premium 386/33TE, 486/25TE, 33TE			
Prem Serv Prem II 386SX/20, 25			
Prem II 386/25, 386/33, 486/33, 486SX/20	8Meg	500780-001	399.00
Premium 386/33T Prem 386SX/16			
Prem II 386SX/20, 25		500790-004	189.00
Premium 386/25, 33, 386/33T, 386SX/16,		500790-003	79.00
Prem II 386SX/20		500790-001	99.00
Premia	8Meg	501158-002	379.00
Premia	16Meg	501158-003	799.00
Premia	32Meg	501158-004	1499.00
Premia	64Meg	501158-005	3111.00

ZENITH MEMORY MODULES

MODEL	AMT. UPGRADED	ZST PART #	PRICE
Z386/33, 25, 20, 33E	1Meg	ZA3600ME	59.00
Z386/33, 25, 20, 33E, 486/25E	4Meg	ZA3600MK	180.00
Z386SX	2Meg	Z-605-1 modules	119.00

MAGNAVOX

286/386SX 16 386SX-20 486SX 20 & 386-33 *all are 72PIN SIMM*

1MEG - 59.00 4MEG - 180.00 8MEG - 409.00 16MEG - 659.00

MEMORY BOARDS
IBM Compatibles & PS/2

USES SIMMS

BOCA AT PLUS

16 BIT MEMORY BD FOR 286 386 AT • 0K-8Meg Bd 4.0 LIM Compat. • New 5 Yr Warr Comment Expnd & Extnd Memory • Supports DOS OS/2 LIM/EMS & EEMS • Versatile Split Memory Addressing • Operates w/CPU Speeds to 33 MHz • Supports Desqview Multitask operations • *Bd made by Boca Research, AT plus*

0K - $84.00 2Meg - $159.00 4Meg - $239.00 8Meg - $399.00

BOCA XT 8 BIT BUS

• Expanded memory for XT • Lim 4.0 compat. 0-2Meg • Uses 256x1-100

0-K - $99.00 1Meg $179.00 2Meg - $219.00

IBM PS/2 32BIT EXPANSION BD.

0 32Meg, Ext.-Expnd. Memory Bd for PS/2 70, 80, 90, Lim 4.0

0Meg	2Meg	4Meg	8Meg	16Meg	32Meg	64Meg
$139.00	$238.00	$319.00	$499.00	$859.00	$1599.00	CALL

PS/2 MCA 0-8MEG EXPANSION BD.

0-8Meg Extended and or Expanded Memory for all IBM PS/2 Models 50, 50Z, 60, 55SX, 65SX 16 Bit, 4.0 LIM Compat

0K - 119.00 2Meg - 199.00 4Meg - 269.00 8Meg - 439.00

USES 1 X 9 SIMMS BOCA Bd M.A.

IBM PS/1, PS/2 MEMORY MODULES

IBM PART NO	WORKS WITH MODEL NO.	PRICE
30F5348 (512K)	30-286	37.00
30F5360 (2Meg)	30-286, 25-286, 30 MTHR BD	104.00
6450375 (1Meg)	80-041	79.00
6450379 (2Meg)	80-111 311-121, 321, 081 181	84.00
6451080 (4Meg)	80-A21, A-81, 80-A31, 80-111 80-311	189.00
6450604 (2Meg)	70-061, 081, 121, 50Z, 55SX, 65SX P-70, 55LS, 65LS, X-Station 120 & 130, 35SX, 35LS, 40SX	89.00
6450608 (2Meg)	70-A21, A-81, B-21, B-61 35SX, 35LS, 40SX, Val Pt	90.00
78X8955 (128K)	25	35.00
34F2933 (4Meg)	35SX 40SX, 55SX, 65SX, 55LS, 65LS	180.00
87F9977 (4Meg)	55SX 55LS, 65SX, 40SX, 35SX, 35LS	180.00
1057035 (512K)	P/S1 286	49.00
92F9935 (2Meg)	P/S1 & P/S1/386SX-2121	99.00
92F9694 (4Meg)	P/S1 & P/S1/386SX Model-2121	189.00
6450902 (2Meg)	56, 57, 57SX 90, 95 P-75, 57SLC Value Point 77 486DX2, 486SX, SVR 85	90.00
6450128 (4Meg)	57SX, 90, 95, P-75, 57SLC, 56, 56SLC, P/S1, 386SX, Mod-2123 2133, 2155, Val Pt 77, 486DS2, 486SX, SVR85 Value Point 77 486DX2 486SX, SVR 85	175.00
6450129 (8Meg)	35SX, 40SX	379.00
6450130 (8Meg)	56 57, 57SX, 90, 95, P-75, 57SLC Value Point 77 486DX2, 486SX, SVR 85	379.00
4010 (16 Meg kit)	RISC System/6000	769.00
4033 (32 Meg kit)	RISC System/6000	1699.00
4036 (64 Meg kit)	RISC System/6000	3319.00

IBM NOTEBOOK & LAPTOP MEMORY

79F0999 (2Meg)	LX40 N33SX, PS Note	103.00
79F1000 (4Meg)	LX40 N33SX, PS Note, Thinkpad 360, 350c	199.00
79F1001 (8Meg)	LX40 N33SX, PS Note	399.00
07G1826 (2Meg)	N51 (all)	103.00
07G1827 (4Meg)	N51 (all)	199.00
07G1828 (8Meg)	N51 (all)	419.00
53G6958/2Meg	Thinkpad 710T	CALL
53G6959/4Meg	Thinkpad 710T	CALL
53G6960/8Meg	Thinkpad 710T	CALL
07G1414 (2Meg)	Thinkpad 750, 750c	119.00
07G1415 (4Meg)	Thinkpad 750, 750c	214.00
07G1416 (8Meg)	Thinkpad 750, 750c	419.00
60G0094 (16Meg)	Thinkpad 750, 750c	959.00
07G1420 (4Meg)	CL57LSX LpTp, Thinkpad 700, 700C, 720, 720C	214.00
07G1421 (8Meg)	CL57LSX LpTp, Thinkpad 700, 700C, 720, 720C	419.00
60G0378 (8Meg)	Thinkpad 350, 350c	359.00
60G0379 (16Meg)	Thinkpad 350, 350c	679.00
92F8804 (2Meg)	N45SL	109.00

COMPAQ MEMORY MODULES

MODEL	AMT. UPGRADED	CMPQ PART #	PRICE
DeskPro 386/33, 386/33L, 486/25 486/33L, 486/50L System Pro	2Meg Module	115144-001	109.00
	8Meg Module	118561-001	429.00
	32Meg Module	116568-001	1459.00
DeskPro 386/33L, 486/33L, DeskPro 386/25 386/20	(Exp Bd)	116569-001	279.00
	1Meg Module	113131-002	79.00
	4Meg Module	113132-001	219.00
DeskPro 386S-16MHz	1Meg Exp Bd	113833-001	149.00
	4Meg Exp Bd	113834-001	329.00
	1Meg Module	113646-001	79.00
	4Meg Module	112534-001	219.00
DeskPro 386/20E DeskPro 386/25E	1Meg Exp Bd	113644-001	149.00
	4Meg Exp Bd	113645-001	329.00
	1Meg Module	113131-001	79.00
	4Meg Module	113132-001	219.00
DeskPro 286N, 386N, 386SX/20, 386/25M, 486/33M, 486/25M 486/16M	1Meg Module	118688-001	59.00
	2Meg Module	118689-001	89.00
	4Meg Module	118690-001	180.00
Port. I Series 486C	8Meg Module	128877-001	389.00
M Series Exp Bd	0-64Meg	129180-001	279.00
DeskPro 386/16	1Meg Kit	108071-001	99.00
	4Meg Kit	108072-001	299.00
	1-2Meg Exp Bd	108069-001	239.00
	4-8Meg Exp Bd	108070-001	437.00
DeskPro 286	512K Kit	113012-001	49.00
DeskPro 5/60, 5/66M, 5/66MT	ALL OF THESE MACHINES USE THESE MODULES 8Meg Kit	149911-001	389.00
Prosignia 5/60	16Meg Kit	149949-001	739.00
Prolsant 100 5/60	32Meg Kit	149912-001	1599.00
Proliant 2000 4/30, 5/66	64Meg Kit	149913-001	2700.00
Prolant 4000 4/50, 5/66	128Meg Kit	149914-001	5900.00
Prolinea 386 3/25S, 3/25ZS	2Meg	141738-001	109.00
	8Meg	141742-001	320.00
Prolinea 486 4/25S 4/33, 4/50, 4/66, CDS	2Meg	141683-001	95.00
	4Meg	141684-001	180.00
	8Meg	141685-001	369.00
Prosignia PC Server, 486/33, 486 DSX/66	8Meg	141685-001	369.00
	16Meg	149320-001	719.00
	32Meg	149147-001	1525.00

COMPAQ LAPTOPS & NOTEBOOKS

LTE/266	2Meg Bd	117061-002	99.00
LTE/266	4Meg Bd	117061-003	179.00
LTE/386S/20	4Meg Module	121125-002	229.00
LTE LITE/20, 25, 25C	4Meg Module	129759-002	229.00
LTE LITE/20, 25, 25C	8Meg Module	129759-003	389.00
LTE LITE/20, 25, 25C	16Meg Module	129759-004	809.00
LTE LITE 4/25C, 4/25E, 433C	4Meg Module	142337-002	199.00
LTE LITE 4/25C, 4/25E, 433C	8Meg Module	142337-003	389.00
LTE LITE 4/25C, 4/25E, 433C	16Meg Module	142337-004	789.00
SLT/286	1Meg Module	110235-001	75.00
SLT/286	2Meg Module	110237-001	249.00
SLT/386	1Meg Module	118303-001	79.00
SLT/386	2Meg Module	118304-001	109.00
SLT/386	4Meg Module	118305-001	219.00
Concerto	4Meg	144790-001	CALL
	8Meg	144790-002	CALL
	16Meg	144790-003	CALL
Contura 320, 325	2Meg	139497-001	104.00
	4Meg	139498-001	189.00
	8Meg	139499-001	349.00
Contura 4/25, 4/25C, 4/25CX	4Meg	146520-001	189.00
	8Meg	146521-001	349.00
	16Meg	146531-001	799.00

PCMCIA VERSION 2.0 (for Palmtop & Subnotebooks)

MODEL	PRICE
S-RAM Cards 1MEG	159.00
S-RAM Cards 2MEG	179.00
Card Pro (made by Data I/O) Transfers data from PCMCIA card to desktop PC. connects to a parallel port	299.00

MODEL	PRICE
14,400/14,400 Data/Fax Modems	319.00
9600/9600 Data/Fax Modems	259.00
2400/9600 Data/Fax Modems	179.00
Lan Ethernet (10 Base T)	219.00
Visual Media (CD Rom, Tape Dr)	279.00

FLASH MEMORY

2.5Meg 259.00 5Meg 389.00 10Meg 599.00 15Meg CALL 20Meg CALL

(Flash Memory Cards appear to the host computer as a hard disk drive. In a DOS environment, your system will see the flash card much like an IDE hard disk drive and assign it a logical drive (e.g.D:) No battery to deal with. Also all capacities come with data compression software to double the amount of flash memory. All flash memory made by Sundisk.)

All products brand new & guaranteed • We buy excess inventory

Trademarks are registered with their respective companies.

L.A. TRADE

22825 Lockness Avenue • Torrance, CA 90501

TOSHIBA LAPTOP MEMORY

MODEL	AMT. UPGRADED	MANU. PART #	PRICE
T1000SE/XE/LE	2Meg	PC14-PA8312U	94.00
T2000/T2000SX	2Meg	PC18-PA8317U	94.00
T2000SX/T1000LE	4Meg	PC-PA8314U	209.00
T2000SX/T1000LE	8Meg	PC14-PA8315U	399.00
T2000SXE/2200SX/T1800, 1850, C	2Meg	PC-PA2000U	94.00
T2000SXE/2200SX/T1800, 1850, C	4Meg	PC-PA2001U	209.00
T2000SXE/2200SX/T1800, 1850, C	8Meg	PC-PA2002U	399.00
T4400SX, SXC T8400	4Meg	PC-PA2004U	209.00
T4400SX, SXC T8400	8Meg	PC-PA2005U	399.00
T4400SX, SXC T6400	16Meg	PC-PA2010U	704.00
T4500 T4500C T4600, T1900, T1900C (3.3 v)	4Meg	PC-PA2012U	219.00
T4500, T4500C T4600, T1900, T1900C (3.3 v)	8Meg	PC-PA2013U	439.00
T4500, T4500C, T4600, T1900, T1900C (3.3 v)	16Meg	PC-PA2014U	959.00
T3300SL	6Meg	PC-PA2008U	329.00
T3300SL	16Meg	PC-PA2009U	899.00
T1200XE	2Meg	PC13-PA8308	99.00
T1600	2Meg	PC8-PA8302U	99.00
T3100	2Meg	PC3-PA7135E	179.00
T3100e	2Meg	PC8-PA8340U	109.00
T3100SX	2Meg	PC15-PA8308U	109.00
T3100SX	4Meg	PC15-PA8310U	209.00
T3200	3Meg	PC8-PA7137U	185.00
T3200SX	2Meg	PC12-PA8307U	119.00
T3200SX	4Meg	PC12-PA8908	209.00
T3200SXC	2Meg	PC19-PA8318U	119.00
T3200SXC	4Meg	PC19-PA8319U	219.00
T5100	2Meg	PC7-PA8301U	95.00
T5200/T8500	2Meg	PC10-PA8304U	114.00
T5200/T8500	8Meg	PC10-PA8313U	419.00

NOTEBOOK, LAPTOP MEMORY

MODEL	AMT. UPGRADED	MANU. PART #	PRICE
ACER 730	2Meg/4Meg/8Meg		109/209/449
ACER 750	4Meg/8Meg/16Meg		189/459/869
ALR Venture	4Meg		249.00
AST Bravo & Explorer	4Meg, 16Meg	12407980 501255-001 -002	199.00/829.00
AST Notebook Prem Exec 386SX/20/25/25L	4Meg	900814-008	199.00
AST Power Exec 3/25C, 425EL	4Meg		199.00
AST Power Exec 3/25C, 425EL	16Meg		819.00
AST Power Exec 4/33SL	4Meg	501166-001	199.00
AST Power Exec 425SL	16Meg	501166-003	819.00
AT&T Safari NSX/20	4Meg	PEC 37851	259.00
Bondwell B310, Plus	1Meg	23050-09100	109.00
Bondwell B310V, SX	1Meg		109.00
Bondwell B310V, SX	4Meg		229.00
Epson NB3	4Meg	A808511	199.00
Everex Tempo LX, LX20 Carrier	2Meg	PCA 00053-0001	99.00
Gateway 2000 Nomad 425 DXL/BXL	4Meg/16Meg		199.00/1549.00
Goldstar GS520 386SX/16	4Meg	S386-4M	249.00
Magnavox Medalist	1Meg, 4Meg	286, 386SX	109.00 199.00
NEC Prospeed 286, 386SX-16	1Meg	PC21-21	79.00
NEC Prospeed 286, 386SX-16	2Meg	PC21-22	199.00
NEC Prospeed 386	2Meg	PC31 21	119.00
NEC Prospeed 386	8Meg	PC31-22	399.00
NEC Prospeed 386SX-20	1Meg	PC43-21	79.00
NEC Prospeed 386SX-20	4Meg	PC43-22	199.00
NEC Ultralite IN/20, 20P, 25C	2Meg	PC47-21	109.00
NEC Ultralite IN/SL/25C	4Meg	PC47-22	199.00
NEC Ultralite SL/20, 20P	2Meg	PC49-21	309.00
NEC Ultralite IN/25C	8Meg	PC47-23	399.00
NEC Ultralite Versa	4 Meg/8Meg/16Meg/20Meg	OP4104	209, 429, 849 104
Packard Bell 386SX, 286	1Meg, 4Meg	286, 386SX	109 199
Panasonic CF170 CF270, CF370	1Meg	CF-BA165	49.00
Panasonic CF380	2meg/4Meg/8Meg		CALL/CALL/CALL
Panasonic CF480	2Meg/5Meg		CALL/CALL
Sanyo 17 18 NB	2Meg	MBC-MBMEM2	99.00
Sharp 6781, 6881, 6785	2Meg/4Meg		109.00/199.00
Sharp PC-6220	1Meg	CE 621B	79.00
Tandon, PCX Nomad, Dataworld	8Meg, 16Meg	NB386SX-20	119.00 449.00
TI Travelmate 2000	1Meg	2568034-0001	79.00
TI Travelmate 3000	2Meg	2566996-1	84.00
TI 4000	4Meg, 16Meg		199.00, 1549.00
Toshiba 1, Altima, Compositive Tandy 4860 486SX DX	4Meg/16Meg		199.00/959.00
Zeos 386SX Notebook	2Meg		99.00
Zenith Master Sport 386SX	2Meg	ZA-300-1	114.00
Zenith Master Sport SL, SLE	2Meg	ZA-4-4	119.00
Zenith Data Sport 286, 286E 286E SX	2Meg	ZA-180-85	99.00
	2Meg	ZA-180-84	179.00
SX Alpha	2Meg	ZA-180-86	179.00
SX Beta	2Meg	ZA-180-87	179.00
Zenith Z-Note 325L, LC	2Meg/4Meg	ZA3250-4/5	129.00/419.00
Zenith Z-Note 425LN, LNC, LNP	4/8/16Meg		269/519/939

LASER PRINTER MEMORY UPGRADES

AMOUNT UPGRADED OK 84	256k	1	2	3	3.5	4	5	6	8	16	32
Canon LBP4, 4Lite, 4plus	–	–	189	219	–	–	–	–	–	–	–
Compaq Pagemarq	–	–	–	99	–	–	180	–	369	–	–
Epson 8000, Action Laser	–	–	–	139	–	–	229	–	–	–	–
Epson Action Laser II	–	–	89	–	Call	–	–	Call	–	–	–
Epson 8000	–	–	89	–	Call	–	–	Call	–	–	–
Epson 1000, 1500	–	–	–	Call	–	–	Call	–	Call	–	–
HP 2, 2D–	–	–	–	109	–	–	189	–	–	–	–
HP 3, 3D, 3P, 2P 2P+	–	–	–	101	–	–	179	–	–	–	–
HP 4, 4M, 4Si, 4SiMX	–	–	–	89	–	–	180	–	364	–	–
HP 4L	–	–	89	–	–	–	–	–	–	–	–
HP 3Si	–	–	89	–	–	–	180	–	359	–	–
HP 4Si	–	–	–	89	–	–	180	–	359	–	–
HP Design Jet 600, 650	–	–	–	–	–	–	180	–	359	–	–
HP Deskjet 500 500C 550	–	89	–	–	–	–	–	–	–	–	–
HP Deskjet 1200C 1200C/P–	–	–	–	86	–	–	180	–	359	–	–
HP Paintjet XL300	109	–	–	–	–	–	289	–	469	837	–
IBM Laser 4019, 4019E	–	–	–	–	–	159	–	–	–	–	–
IBM Laser 4029	–	–	–	–	–	–	180	–	–	–	–
IBM Laser 4039, 4079	–	–	–	99	–	–	180	–	350	–	–
NEC 90, 290	–	–	–	139	–	–	–	–	–	–	–
NEC 95, 97	–	–	–	99	–	–	–	–	–	–	–
Oki 400	–	–	–	89	–	–	–	–	–	–	–
Oki 400 E	–	–	135	169	–	–	–	–	–	–	–
Oki 830 840	–	–	–	109	–	–	–	–	–	–	–
Packard Bell PB 9500	–	–	–	139	–	–	227	–	–	–	–
Packard Bell 9815	–	–	–	160	–	–	299	–	–	–	–
Panasonic 4420/4450i	–	–	–	129	–	–	209	–	–	–	–
Panasonic 4410/4430	–	–	–	126	–	–	195	–	–	–	–
Panasonic 4450	–	99	–	–	–	–	–	–	–	–	–
TI XL/PS17/PS35	–	55	–	–	–	–	–	–	–	–	–

H.P. COMPATIBLE FONT CARTRIDGE

BAR CODES Bar Code Reader Fonts	99.00
DESKJET SOLUTION for DeJt 500 & Plus, 92 Fonts, 4.5 pt-30 pt	99.00
IBM 4019, 4019E, FONT CARTRIDGE 209 Fonts Turbo Card	105.00
TURBO 25 Comparable to Pacific Data's 25 CARTRIDGES IN ONE!™, 143 Fonts *(compat. with Epson Action Laser II and all HP Printers except HP4)*	80.00
TURBOSCRIPT™ 105 Scalable Fonts to Any Point Size (HP 2 2D– 139 159, 199)	179.00
TAX & FINANCE FOR IBM 4019, 4019E, 4029	139.00
TAX & FINANCE CARTRIDGE	84.00
OKI 400, 800 41 fonts, 11 typestyles	169.00

MC SURCHARGE HP MASTERCARD AMEX VISA DISCOVER PURCHASE ORDERS ALL EFTEE FROM FOR TIME 200 GOVERNMENT & INSTITUTIONS Lasertrax orders add 8.25% sales tax Returned orders or ordered wrong parts are subject to a 20% restocking fee Memory chips not installed in boards - We accept international orders shipped via UPS Air APO FPO orders welcome Customers are expected to pay customs and native charges Transportation & handling charges verified for fraudulent use SORRY NO REFUNDS AFTER 30 DAYS. [illegible] Checks allow 2 weeks to clear Money orders cashiers checks cash & cashiers checks ship immediately Wire transfer T&C • ALL MANUFACTURER PART # • All [illegible] • MINIMUM ADER $4.00

Prices and availability subject to change without notice

CUSTOMER SERVICE & TECHNICAL: OPEN M–F, 9–4 PST

310-539-0019
FAX: 310-539-5844

PRICES SUBJECT TO CHANGE WITHOUT NOTICE

CALL TOLL FREE **1-800-433-3726** (US and Canada)

ESTAB. 1985

SORRY, NO WILL CALLS

Mon-Fri, 8:00 a.m. to 5:00 p.m. PST
Sat. 10:00 a.m. to 12:00 noon

PRICES MAY FLUCTUATE. CALL FOR LATEST PRICING!!

CIRCLE 019 ON READER SERVICE CARD

Here's the Most Comprehensive Source of Computer Information *Anywhere*

FREE DISK*

GET:
Accurate, up-to-date information to make informed decisions.

LOCATE:
Hard-to-find products for special needs.

DETERMINE:
Whether products are compatible with your current equipment and systems.

LEARN:
Tips and techniques to improve hardware and software performance.

SAVE:
Time and money. Access thousands of articles and product specs that'll help you make better decisions.

EVALUATE:
Competitors' products and marketing strategies, instantly.

FIND:
Tech support, sales, and fax numbers. Addresses and company stats too.

COMPARE:
New products. Know where you stand, whether you're buying or selling.

"...tons of useful information about the industry, including a year's worth of articles from every conceivable computer-related publication."

John C. Dvorak, PC/Computing

"...Computer Select provides not just the information we need, but also a way to find it and a convenient way to store it."

Esther Dyson, Editor, Release 1.0

Computer Select

The Fastest, Easiest Way to Get Computer Product and Industry Information

- 75,000 articles from over 160 publications
- Over 13,000 company profiles
- 75,000 product specs
- Updated monthly

Call **1-800-827-7889 ext. 415**

Federal Government Employees: Call 1-800-759-9103

*One free disk when you subscribe.

©1993 Ziff Communications Company. Computer Select is a registered trademark and Computer Library is a trademark of Ziff Communications Company. All rights reserved.

Ziff COMPUTER LIBRARY™

CIRCLE 158 ON READER SERVICE CARD

PC MAGAZINE MARKETPLACE INDEX

Premier
The color showcase that puts the spotlight on leading-edge PC products and services.

405-418

Windows
An every-issue four color section featuring quality products for the Windows environment.

419

Classified
Flexible-format display advertising: computer systems, components, software and more.

420-432

BusinessCard
A forum for innovative, hard-to-find and low cost PC hardware, software and services.

433-436

	Premier	Classified
HARDWARE		
Boards/Components/Chips	406	420
Communications	406	
Computer Systems	407	420
Input/Output Devices/Barcoding	408	422
Mass Storage Devices	410	424
Midi	411	
Multi-Media	411	
Networking	413	
OS2		
Security		
Video		

	Premier	Classified
SOFTWARE		
Business Applications	414	424
—Accounting		
Communications		
Education	415	425
Financial		
Graphics/Design		425
Multi-Media	415	426
—Midi-Music		
Personal	416	
Public Domain		
Scientific	416	
Security		426

	Premier	Classified
Shareware		428
Systems/Languages		
Utilities	417	428
Vertical Applications		
Video		
Adult		430
SUPPORTING PRODUCTS		
Information Resources	418	428
Services		428
—Data Conversion		428
—Data Recovery		429
—Software Duplication		428
Supplies		429

PC-EXTENDER PLUS™

Extend the distance between your PC and a keyboard, VGA monitor and mouse up to 250 feet!

- Supports PC, PC/XT, PC/AT, PS/2 and 100% Compatibles
- Supports monochrome or color VGA monitors
- Offers conversion from RGB color to gray-scale
- PS/2 style or Microsoft/Logitech serial mouse support available

PC-COMPANION PLUS™

Add a second keyboard, monitor and mouse to your PC up to 250 feet away!

- Supports PC/AT, PS/2 and 100% Compatibles
- Combine monochrome and color VGA monitors
- Mouse support available at both local and remote workstation
- Switch selectable privacy mode

IBM, PC, PC/XT, PC/AT and PS/2 are registered trademarks of International Business Machines Corporation. Microsoft and Logitech are registered trademarks of their respective companies.

CYBEX
4912 Research Drive · Huntsville, AL 35805 U.S.A.
(205) 430-4000 · FAX (205) 430-4030
Dealer Program Available
Made in USA

CIRCLE 751 ON READER SERVICE CARD

Upgrade?

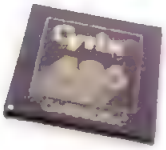
$1899 (Good)

Checkit 3.0 (Dhrystones in 1,000's)

Cost per Dhrystone difference between 386DX and 486SX = $.18 per Dhrystone

i486SX, 33 MHz, 8K cache.

$349 (Better)



Cost per Dhrystone difference between 386DX and 486SX = $.08 per Dhrystone

Cyrix 486DRX2, 20/40 MHz, with 1K cache installed in a Compaq® Deskpro 386/20e (386DX, 20 MHz).

$349 (Best) $449*

Cost per Dhrystone difference between 386DX and 486SX = $.05 per Dhrystone *$.03 per Dhrystone

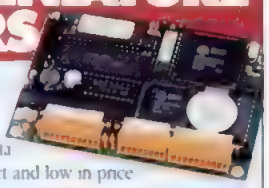
Evergreen *REV TO* 486™, 20/40 MHz, with 8K cache installed in a Compaq Deskpro 386/20e (386DX, 20 MHz). *REV TO* 486, IBM = 20/60 MHz, 16K cache.

Distributors: DataLink NW (800) 544-1720, GSA# GS00K-93-AGS-6304
Treasure Chest (800) 677-9781, FAX (504) 461-8095
Brentwood Bus. Syst. (800) 431-8542, FAX (303) 431-6647

Evergreen Technologies

CIRCLE 752 ON READER SERVICE CARD

LOW COST MINIATURE CONTROLLERS



Save time. Save money.

Our wide range of C-programmable miniature controllers are ideal for control applications, data acquisition, and test and measurement. Compact and low in price (the Little PLC above is 2"x3" and $195), these controllers are programmed with our easy-to-use Dynamic C development system. Our controllers feature digital I/O, ADCs and DACs, relays and solenoid drivers, RS232, RS485 serial ports, battery backed memory and time/date clock, LCDs, keypads, enclosures and more!

WORLD ENGINEERING

1724 Picasso Avenue
Davis, CA 95616
916 757 3737
916 753 5141 FAX

24-Hour Information Service 916 753 0618
Call from *your* FAX and follow the instructions

CIRCLE 755 ON READER SERVICE CARD

ROM BIOS UPGRADES

IF YOU'RE PLANNING AN UPGRADE TO A NEW IDE HARD DRIVE OR WISH TO HAVE SOME OPTIONS AND CONTROL OF YOUR MOTHERBOARD, YOU WILL NEED A BIOS.
WE ARE THE ORIGINAL BIOS DISTRIBUTOR!!!

- Supports: IDE Drive, OS/2, Unix, Cyrix CPU
- Set-up in ROM, Faster ISO Speed
- Anti-Virus & Password Protection
- Four Floppy support up to 2.88MB

MOTHERBOARDS

386DX/40MHz w/128k (486 UPGRADABLE)	$169.95
VI486 VL-Bus w/256k w/OUT CPU	$174.95
CX486DLC/40 VL-Bus w/256k	$279.95
486DX/33 VL-Bus w/256k	$449.95
486DX2/66 VL-Bus w/256k	$644.95
PENTIUM 60MHz PCI, VL-BUS w/512k	$CALL

PENTIUM OVERDRIVE UPGRADABLE 2 YR WARRANTY
ISA, VESA, PCI, EISA, MOTHERBOARDS AVAILABLE

UPGRADE YOUR PC

Increase the speed of your 286 or 386 by as much as 400%!!

486 Chip Replacements for 286's
Cyrix DRx2/SRx2 486 CPU's for 386's
Upgrade CPU's Starting Under $30
Guaranteed Compatibility!!!
Call for Current Pricing

Hard Drives, VESA/PCI HDD Cards, VESA/PCI Video Cards, Mathco's, CPU's, Memory!

TTi Technologies Inc 805-650-2040
1445 Donlon St #9 Fax 805-650-0515
Ventura, Ca. 93006 Call for Free Catalog!

1-800-541-1943

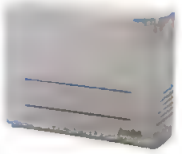
CIRCLE 756 ON READER SERVICE CARD

CIRCLE 753 ON READER SERVICE CARD

STOP COPYING FAXES!

PLAIN PAPER FAX

From Your Printer with *FaxPak*



- No Computer Required
- Connects to Serial or Parallel Printer Port
- Connects to PC or Net Server to Share Printer
- Receives and Stores Faxes if Printer is Busy or Off
- Built-in Auto Switch to Share Phone Line with Telephone, Fax, and Answering Machine
- For Laser, Inkjet and Dot Matrix Printers
- 2 Year Warranty. 30 Day Money Back Guarantee.

$249 * Reg. $299

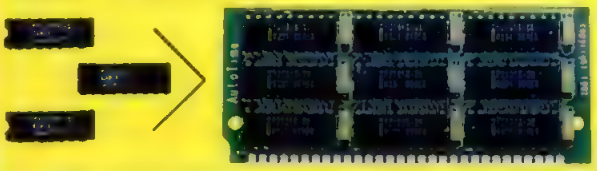
Teledisk Systems, Inc.
2401 Mannship Way Sausalito, CA 94965

Orders: 1-800-669-3700

CIRCLE 757 ON READER SERVICE CARD

DIP to SIMM

Call on Other RAM Conversions



Convert obsolete *RAM* into useful *RAM*

Turn surplus memory chips into a useful SIMM module format

Call on *new* 72-PIN SIMM conversions

DIP - SIMM		SIP - SIMM
Your chips $13.50 (We assemble)	Board Only $8.50 (You Solder)	Your chips $13.50 (We assemble)

AUTOTIME 24 Hour AutoFAX (503) 452-0208
6605 SW Macadam - Portland, OR 97201 Ph:(503) 452-8577 Fax: (503) 452-8495

CIRCLE 754 ON READER SERVICE CARD

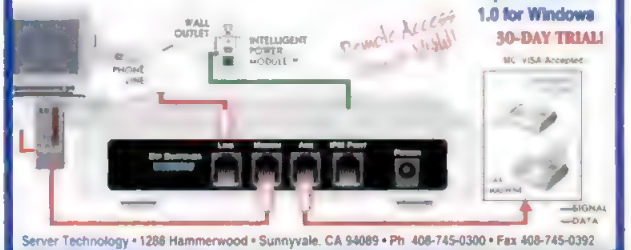
REMOTE POWER ON/OFF

$169.95

- Power on your PC from anywhere in the world!
- Reboot a Locked-up Remote PC.
- Share a Modem & Fax Machine on a single phone line.

+Fax $199.95

w/pcANYWHERE 1.0 for Windows 30-DAY TRIAL!



Server Technology • 1288 Hammerwood • Sunnyvale, CA 94089 • Ph 408-745-0300 • Fax 408-745-0392

TO ORDER CALL 1-800-835-1515

CIRCLE 758 ON READER SERVICE CARD

PRIMAX HAS FOUND THE MISSING LINK!

- Offers true networking capabilities like remote drive mapping, file sharing and E-mail for a fraction of network costs
- 32 nodes maximum—up to 16 printers
- Uses standard modular telephone-type cabling
- 625Kbps data transfer rate and compression technology with CRC error-checking for fast, reliable communication
- Totally self-contained parallel port connections—no internal network cards to install
- Easy-to-use MS-DOS Pop-Up TSR and Microsoft® Windows™-compatible Connectivity Software
- Retail price $119 per node

Agressive Reseller Programs Available

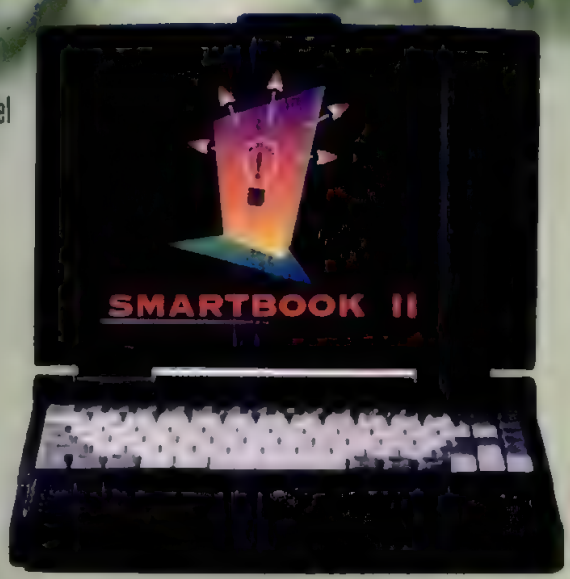
TO ORDER CALL
1 (800) PRIMAX-1
1 800 774 6291

PRIMAX ELECTRONICS

CIRCLE 759 ON READER SERVICE CARD

It has Einstein's brain, Van Gogh's canvas & more ports than San Francisco.

- 486DX-33, DX2-50, DX2-66 Upgradable CPU
- 9.5" Detachable and upgradable LCD panel
  - Active Matrix Color
  - Dual Scan Color
  - Monochrome
- Local Bus Video
- Upgradable to 1MB Video Memory
- Upgradable to 32MB RAM
- Upgradable Hard Drive



- Removable 1.44MB floppy drive (allows for 2nd battery pack)
- 2 type II PCMCIA Slots or 1 type III
- Ergonomically designed keyboard with 25mm built-in trackball
- Built-in digital audio
- Built-in speaker & microphone
- Rechargable NiCd/NiMH battery
- Optional Docking Station

800-5-COMMAX In CA: 408-435-5005

COMMAX TECHNOLOGIES, INC. 2031 Concourse Drive, San Jose, California 95131 • Fax: (408) 435-5005

CIRCLE 760 ON READER SERVICE CARD

YOU'RE NOT GOING TO PAY A LOT FOR A GREAT NOTEBRICK

For the lightest in on-the-go computing our new 486 SubBrick is the perfect travel PC for those who can never take too little. It's powerful enough to run Windows, yet it weighs just 3.8 lbs and runs 4-6 hours on a charge. Full featured with a 3 volt 486SLC-25 CPU, up to 170MB HD & 8MB RAM, external color SVGA out, and 2 Type II or one Type III PCMCIA slots for super expansion. The 8.5" backlit mono LCD is easy to see in any light, and the full pitch, full travel keyboard and front trackball will please even picky typers.

$1,495

4-Year GE Service Warranty Included!

Other NoteBooks

The PowerBrick 66

[illegible] $2,395

The NoteBrick 33

[illegible] $1,395

CALL TODAY
1-800-633-1925
M-F 9-6 EST

24 Hr. Automatic FAX Info
1-800-723-0778
Access #1290

One Intercontinental Way, Peabody, MA 01960 (508) 535-7510 FAX: (508) 535-7512

CIRCLE 761 ON READER SERVICE CARD

Crammed into your laptop?

Up to 1.1 GB for laptops

NOW NOTEBOOKS 340 MB!

Now Service and Repair

Are you outgrowing your laptop or notebook's capacity? Tired of software "quick fixes"? Now you can get the storage you need to effectively operate today's data-intensive applications and operating systems.

Up to 340 MB for notebooks

LSI specializes in internal upgrades. We can replace the factory-original hard drives in Toshiba, Compaq, and other major manufacturers' laptops and notebooks with higher-speed, higher-capacity drives without adding bulk or weight. If you're feeling the applications squeeze, call us. You'd be surprised how much room there is in your laptop . . .

LAPTOP SOLUTIONS

(800) 683-6839
Laptop Solutions, Inc.

10700 Richmond Ave., #114 Houston, Texas 77042
Local: (713) 789-0878 FAX: (713) 789-8177

All product names are trademarks or registered trademarks of their respective owners.

CIRCLE 763 ON READER SERVICE CARD

CYPRESS VLB NOTEBOOK

"NO. 1" Graphics Winmark Test
"Excellent" for Windows Applications
"Excellent" for Dos Applications
"Excellent" for Desktop replacement

Special Features:
VESA Local Bus+128K Cache+PCMCIA III
+ VLB Docking Station (Optional)

Model 820	Mono	Dual Scan Color	Active Color
486SX-33	[illegible]	[illegible]	[illegible]
486DX-33	[illegible]	[illegible]	[illegible]
486DX2-66	[illegible]	[illegible]	[illegible]
Super Docking Station	[illegible]		

• Prices include trackball, 4MB RAM, 120 MB HDD, 1.44 MB FDD, carrying case & battery

To Order: 1-(800)728-6688

CYPRESS COMPUTER, INC. 26120 Eden Landing Rd. • Hayward, CA 94545
(510) 786-9106 • FAX (510) 786-9553

CIRCLE 762 ON READER SERVICE CARD

LCD Active Color 486DX-33 $3800
4MB RAM
1.44 MB Floppy Drive
120 MB Hard Disk
2 Expansion Slots Free
External Monitor Ports
LCD Passive Color $2790
CRT Color $2190

Please Call for Other Configuration & Details:

CTI COMPUTOP INC
14634 Firestone Blvd., La Mirada, CA 90638
(Tel) 714-994-0605 (Fax) 714-994-0658

CIRCLE 764 ON READER SERVICE CARD

ENVISIONS

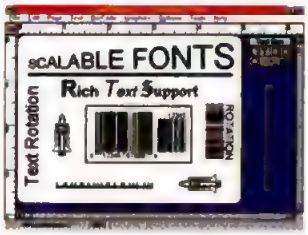
Color, grayscale, flatbed and handheld scanners bundled with text & image software from $179. Call for a free catalog!

Questions? We love questions!™ Call our scanner hotline: (800) 934-SCAN
Local (415) 692-9061 • Fax (415) 692-9064 © 1993 E.S.T., Inc., 022 Molder Rd., Burlingame, CA 94010

The Next Generation in Label Design Software

LabelWorks™

for Windows



LabelWorks sets the new performance standard for professional quality label design. No other program combines such easy operation with this much power!

- Provides Desktop Publishing features to enhance label design. Features include: WYSIWYG, rulers, guides, page zooms, lines, shapes.
- Rich text support allows you to edit font styles, types, and sizes within the same line.
- Supports all major Bar Code symbologies, including Code 39, 93, 128, POSTNET, UPC, Bookland EAN. 19 types in all.
- Imports & Exports using TIFF, GIF, BMP, PCX, WPG, WMF, TARGA graphic files.
- Rotates Text, Bar Codes and imported graphics in 90 degree increments.
- Prints labels on virtually any windows supported printer.
- Prints labels directly from dBase, DIF & ASCII files.

Dealer Inquiries Welcome.

Call for Free DEMO Software

AMERICAN MICROSYSTEMS
2190 Regal Parkway, Euless, TX 76040
(800) 648-4452 (817) 571-9015 FAX (817) 685-6232

Only One Thing Could Be Easier Than Our Bar Code Printing Software.

StrandWare offers you a full line of easy to learn, easy to use bar code printing software packages. In less than an hour, you can be printing most popular bar codes with virtually any printer. We also offer Bar Code Library, which lets you print bar codes from within your own programs. Call (800) 552-2331 or fax (715) 833-1995.

StrandWare
For Anyone Who's Keeping Track

CIRCLE 767 ON READER SERVICE CARD

Money Back Guarantee & 1-Yr. Warranty

Popular Space-Saver Keyboard $98.00

Saves 60% desk space. Footprint 27.3 x 15.2 cm. 100 full-travel tactilly responsive keys. Standard left-right spacing for easy touch typing. IBM XT/AT PS 2 compatible. Many language versions available.

Call Toll Free To Order: 1-800-DATALUX

DATALUX
– VISA, MC, AmX –
155 Aviation Dr.•Winchester, VA 22602
Tel 1-703-662-1500•FAX 1-703-662-1682
Auto-FAXed Specs FAX 1-703-662-1675

CIRCLE 765 ON READER SERVICE CARD

Bright color. Bright price.

$2,599.

The BOXLIGHT 1285 ColorShow Projection Panel. Our brightest true-color panel. And for $950 off the list price, it's an unbeatable value.

- Compact, easy-travel panel
- 640 x 480 resolution
- PC and Mac compatible
- FREE remote and cables

Your direct source for all the bright answers.
- Widest selection
- Instant availability
- Overnight shipping
- 30-day guarantee

BOXLIGHT
17771 Fjord Dr. N.E., Poulsbo, WA 98370
206-779-7901 • Payment: Visa, MasterCard, American Express, C.O.D. and Purchase Orders (some restrictions). Leasing and rental options available. 30-Day Money-Back Guarantee

Call Today 1-800-497-4007

CIRCLE 802 ON READER SERVICE CARD

Green Keeper™

Save Money, Save Energy

Energy-Saver for PC Peripherals

It's easy! Works like a screen saver! Simply connect Green Keeper to the keyboard of any IBM-AT compatible. Plug in your monitor and other peripherals, set the inactivity period with the DOS or Windows software, and Green Keeper will turn them off automatically. Touch a key or the mouse to restore power. It doesn't interfere with your CPU!

It's economical! $69.95 converts your existing computer into an energy saving computer. Green Keeper can pay for itself in less than a year. No hefty investments in new hardware.

It's ecological! Green Keeper uses environmentally friendly materials and is Energy Star Compliant.

Only $69.95* *Suggested Retail Price

Call (815) 434-0846
FAX (815) 434-7094

B&B electronics MANUFACTURING COMPANY
4000 Baker Rd PO Box 1040M
Ottawa, IL 61350

CIRCLE 766 ON READER SERVICE CARD

How to make powerful new connections in 10 seconds. Or less.

The new Adaptec SlimSCSI host adapter instantly connects your PCMCIA-ready notebook or PDA to SCSI-based peripherals, including the latest CD-ROMs, tape drives, and scanners. It's the quickest way to tap into your database or add some pizazz to your presentations, no matter where you are.

Getting started is just as quick. SlimSCSI comes bundled with SCSIworks!, the DOS/Windows software that makes it easy to load drivers for the peripherals you're using.

Ask your dealer for Adaptec's latest IOware product, the new SlimSCSI host adapter. Or, for PDAs and notebooks with parallel port connections, ask for Adaptec's MiniSCSI. For more information about either product, call 1-800-934-2766 (1-408-957-7150 for information by fax).

They're great ways to make new connections. Fast.

adaptec

NOW MORE IMPORTANT THAN EVER

Copyright © 1994 Adaptec, Inc. All rights reserved. Adaptec, the Adaptec logo, SlimSCSI, and IOware are trademarks of Adaptec, Inc., and SCSIworks! and MiniSCSI are trademarks of Trantor Systems Limited, an Adaptec company, all of which may be registered in some jurisdictions.

BEST 9-TRACK TAPE SOLUTION OF THE 90'S!

• PC 286/386/486
• RISC/6000 • AS/400
• SUN • HP • DEC • APPLE

Our name begins with Quality!
Call us today for price and information.

QUALSTAR®

9621 IRONDALE AVE., CHATSWORTH, CA 91311
FAX (818) 882-4081 • (818) 882-5822

CIRCLE 768 ON READER SERVICE CARD

9-TRACK FOR PCs

Mainframe To PC Data Interchange

Rock solid solutions, rock bottom prices.
Direct from the manufacturer. 1600/3200/6250 bpi.

- The most trusted name in 9-track, since 1980
- Powerful, easy-to-use software tools included

Overland Data Inc.
800-729-8725

TEL 619-571-5555
FAX 619-571-0982
EUROPE:
TEL +44 734-89189?
FAX +44 734-89?8?7

Ask about 3480 with IDRC.

CIRCLE 769 ON READER SERVICE CARD

3480/3490 9 TRACK

WINDOWS DOS NOVELL OS2 UNIX

WINDOWS TAPE SOFTWARE!
TAPE BACKUP
TAPE DUPLICATION
TAPE CONVERSION

Featuring Fujitsu Quality Products!

LAGUNA DATA SYSTEMS
7340 Smoke Ranch Road Suite C, Las Vegas, NV 89128
TEL: (702) 254-2648 FAX: (702) 254-0910

800-938-TAPE

CIRCLE 770 ON READER SERVICE CARD

DOS

FREE ISSUE!

Inside DOS is guaranteed to help you get the most out of DOS. But don't take our word for it. See for yourself.

Subscribe today and you'll get 13 issues for the price of 12 for only $39! If you decide *Inside DOS* is not for you, mark "cancel" on your invoice and return it. Your free bonus issue will be yours to keep with no further obligation.

Call for your FREE ISSUE today!

1-800-223-8720

Please mention code V5NY

NOW all of the PCTD-1 features that earned PC Magazine recognition as "Editor's Choice" and "the clear winner among nine-track back-up devices" are available with a complete line of NineTrack 3480/3490 SCSI Controller Kit and tape subsystem solutions. Like the PCTD line, the new SCSI line reads/ writes to 9-track and 3480/ 3490 tape with your IBM*PC/XT*/AT* 386,486, PS/2*andcompatibles. Exchange data withother PCs, minis and mainframes using a variety of tape densities.

3480/3490 (IDRC) & NineTrack system features:

- Auto & cartridge load systems
- Data transfer rate up to 43.56 MB/minute
- Interchange & backup software
- RawView data extraction & conversion software
- 800.1600/3200/6250 bpi & 3480/3490 (IDRC) systems available
- Telephone access to dedicated product line technical support

COMPUTER LOGICS

800-828-0599

Fax: 216-349-8609

CIRCLE 771 ON READER SERVICE CARD

Syquest/Bernoulli Challenge

UNBEATABLE

OPTICAL DISK OFFER!

512MB (4 disks)

only **199**

+LIFETIME WARRANTY!*

1-800-873-1MLO (408) 945-0946 FAX

1/3-1/5 the Cost

Optical disks will save you $300 to $500 everytime you add 500MB of storage!

10 Times More Reliable

No head crash or media wear. Endorsed worldwide, optical disk is far superior in reliability and ruggedness to Syquest & Iomega's magnetic disk

128MB Mini Drive	$799
128MB SCSI Ext. Unit	$899
Portable 128MB	$959

DOS, Windows, OS/2 & Mac Compatible

Fast! Works Like Hard Drives

Features the fastest 3.5" 128MB SCSI-2 rewritable optical drive. Ideal for adding storage, backup and exchange data.

CIRCLE 772 ON READER SERVICE CARD

Replace Synth Envy Without Replacing Your Sound Card!

In the beginning, we created the first 16-bit Windows sound card. Then the first wavetable synthesizer for Windows Multimedia. Now, our latest first lets you customize your synthesizer forever... Introducing Turtle Beach Maui with SampleStore!

You've suffered through the "Heartbreak of FM Synthesis." Now's the time to add Turtle Beach quality to your existing sound card. Maui™ delivers 128 crystal clear wavetable instruments — perfect for multimedia presentations, General MIDI music software, and Windows and DOS games...all for half the price of a Roland, MediaVision, or Creative Labs wavetable sound card.

We've also added SampleStore™ — 256K of sample RAM, so you can take any existing Windows wave file, load it into Maui, and then play it back like any other MIDI instrument. SampleStore is also upgradeable to 8 megs of RAM, which means adding hundreds of your own samples to Maui is a snap. See your favorite dealer, or call 800 845 5846 for more information.

TURTLE BEACH SYSTEMS

52 Grumbacher Road • York, Pennsylvania • 17402
717-767-0200 • FAX 717-767-6033

All trademarks are registered by their respective companies. Specifications may change without notice.

CIRCLE 775 ON READER SERVICE CARD

Will your 9-Track Subsystem....

- ✔ Offer tape speeds from 100 to 150 ips?
- ✔ Read and Write all four 9-Track Densities?
- ✔ Work in concert with other SCSI-2 devices?
- ✔ Be backed by a company who has produced 9-Track drives for over 20 years?

Features like these make *M4 Solutions* the only choice for your demanding high performance applications.

....3480/90 Solutions also in-stock

M4 **M4 Solutions**

10855 Sorrento Valley Rd. San Diego, CA 92121
619-597-0516 Fax: 619-597-0936

800-240-8270

8 AM Eastern to 5 PM Pacific

CIRCLE 773 ON READER SERVICE CARD

Starting From **$1795**

We Project Your Promotion

For the latest in color projection panels and projectors call the experts in LCD technology. Your satisfaction guaranteed or your money back.

FREE CATALOG **1 800 726 3599**

SALES•LEASES•RENTALS

Panelight

101 The Embarcadero Ste. 100-A San Francisco CA 94105
Hours 6:30 to 5:30 PST 9:30 to 8:30 EST
VOICE 415 772 5800 FAX 415 986 3817

CIRCLE 776 ON READER SERVICE CARD

3480•9-Track•4mm•8mm

Data Interchange Solutions
Data Conversion
Tape Duplication
Backup & Restore

DOS-OS/2-Unix
Windows-Networks
RS/6000-SUN

(602)396-3616

novastor corporation
30961 Agoura Road Suite 109
Westlake Village, CA 91361
Fax (818)707-9902

Hardware and Software Solutions

CIRCLE 774 ON READER SERVICE CARD

Take Up Weightlifting Or Take Advantage.

Turtle Beach Audio Advantage™... $129.00 PCMCIA Sound Card.

Put "portable" back into the portable presentation. With the Audio Advantage™ PCMCIA sound device, you simply snap the card into place, plug in suitable speakers or headphones, and in seconds your multimedia presentation is ready to go with the highest quality sound.

See your favorite dealer, or call **800-645-5640** for more information today!

CIRCLE 777 ON READER SERVICE CARD

TURTLE BEACH SYSTEMS

52 Grumbacher Road • York, Pennsylvania 17402 • (717) 767-0200 • FAX: (717) 767-6033

HIGH-END SOUND, LOW-END PRICE

THE SOUND ENGINEER DSP

- Integrated software & hardware for signal processing simultaneously provides real-time compression/decompression, reverberation, 20 band equalizer, and more!
- Based on the STAR™ Semiconductor SPROC™ processor, the most flexible and powerful audio DSP available
- Internally 4 parallel DSPs run up to 40 million instructions per second (40 MIPS)

THE ORCHESTRA

- OTTO synthesizer chip is the same chip used in the world-renown professional ENSONIQ™ ASR-10 Synthesizer™
- Uses ENSONIQ Soundscape™ Technology
- Hardware generation of 32 simultaneous voices, 32 polyphonic notes, envelopes, & panning
- Uses the ENSONIQ sound library; the world's largest wave table library!
- Absolutely no "stutter" -- Unlike others, our audio record/playback maintains 4k buffers. No overhead audio record/playback with Audiobuffer™

THE CONDUCTOR

- On-board Motorola™ MC68EC000 microprocessor off loads the PC and makes SoundTrax self-sufficient
- Allows for enhanced board capabilities

They're not going to believe us. $289 for all these features? Record and playback at 44.1 KHz, Wave Table Synthesis, compatible with all popular sound board standards...that's just the beginning.

Unlike other brands, our DSP earns its keep. Very few offer compression/decompression, reverb, chorus, and a true 20 band graphic equalizer.

	MOST OTHER BRANDS	SOUNDTRAX
Base System	$260	$289
Hardware Wave Table Synthesis	$200	Included
SCSI CD ROM interface	NO	Included
Sony™ CD ROM interface	A Few	Included
On board microprocessor	NO	Included
Real Time Compression/Decompression	A Few	Included
Simultaneous Record and Playback	NO	Included
Reverberation	NO	Included
4K Audio Buffering DMA	NO	Included
4 in 1 DSP	NO	Included
Usable DSP Effects	Few, if any	Included
MPU-401, MT-32, General MIDI	A Few	Included
Separate A/D and D/A for improved performance over single CODECs	NO	Included

SoundTrax won't tie up your host computer with needless overhead. Our Motorola 68EC000 runs a complete, self-contained operating system for the sound board. *Forget about stutter.* Our PCM record/playback maintains 4k fast Audiobuffers so you don't miss a beat. Our secret is revolutionary architecture. Three separate processors work together to provide an impressive array of standard features. **Finally, we're not playing the add-on game.** All necessary hardware and software is included. Professional sound, all the extras, one low price.

only **$289**

including 2 day shipping
30-Day Money-Back Guarantee

7 Year Guarantee

SoundTrax™ by KALIX™ Ltd

1-800-260-6771

KALIX Ltd, SoundTrax, Sound Engineer DSP and Audiobuffer are trademarks of Kalix Ltd. All other trademarks are property of their respective holders. Prices & specifications subject to change without notice.

CIRCLE 778 ON READER SERVICE CARD

What Do PC Jet Jockeys Want?

Hair-Raising Sorties
Death Defying Maneuvers
Heroics
Victory
Realism
HOTAS™

ThrustMaster® Controls

NEW PRODUCT

Mark II WCS™ (Throttle)

FCS™ (Joystick)

RCS™

(Rudder Pedals)

10150 S.W. Nimbus Avenue, Portland, OR 97223-4337
Phone (503)639-3200 Fax (503)620-8094

CIRCLE 779 ON READER SERVICE CARD

VGA▶TV Elite. Big-Screen Multimedia Presentations Made Easy.

Under $400!

FEATURES
640x480 resolution
16.7 million colors
Flicker-free video
Light weight

Just connect VGA-TV Elite to a VGA card and any TV and *presto!*...big-screen presentations. It's that simple. Compare VGA-TV Elite's features to any of the alternatives (all unwieldy and costing up to 10 times as much), and you'll easily see there simply is no other choice.

FREE! With every VGA-TV Elite, get "Presentation Tools" software—featuring 3 super presentation features

Advanced Digital Systems
Call **(800) 888-5244.** 8am–6pm M-F Pacific Time
20204 State Rd•Cerritos, CA•90701•(310)865-1432•(310)809-6144 (Fax)

ADS VGA-TV Elite. Easily the Best.

CIRCLE 780 ON READER SERVICE CARD

Wireless Ethernet

The Easiest Way To Extend Your LAN. Period.

AIRLAN™/Bridge
Links LANs in separate buildings up to 3 miles.
Eliminates costly T1 and slow DDS leased lines
Performs up to 40x faster

AIRLAN™/Internal
Wireless ISA and MCA cards support NetWare, LANtastic, Banyan Vines, and more
Extend your LAN in minutes

SOLECTEK
(619) 450-1220

6370 Nancy Ridge Drive, 109 San Diego, CA 92121. FAX (619) 457-2681

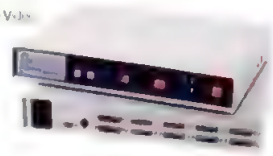
CIRCLE 781 ON READER SERVICE CARD

CONTROL ALL YOUR PC SERVERS

FROM ONE KEYBOARD AND MONITOR

COMPARE QUALITY AND PRICE PERFORMANCE with *MasterConsole*

- Save Space, Cut Costs & Centralize Control With 100% Reliability
- "Plug and Play" Any Mix of PC/ATs & PS/2s, All Video
- Desktop or 19" Rackmount Models for 2, 4, 8, 16 PCs, Expand to 64
- Keyboard Emulator for Error Free PC Autoboot and PC Operation
- AUTOSCAN™ to Monitor All PCs
- MouseShare™ for PS/2 & Serial Mouse
- Thousands in Use Worldwide GSA Schedule for U.S. Federal Govt 30 Day Money Back Guarantee



CALL TODAY!
(908) 874-4072 x81

RARITAN COMPUTER, INC. 10-1 Ilene Court Belle Mead, NJ 08502 FAX (908) 874-5274

Germany - Elsner Computertechnik	Tel: 49-521-889877	Fax: 49-521-889925
Japan - Proside Corporation	Tel: 81-3-3254-6131	Fax: 81-3-3254-6134
The Netherlands - Artelcom B.V.	Tel: 31-10442-3313	Fax: 31-10442-3443
United Kingdom - Kemitron LTD	Tel: 44-244-536123	Fax: 44-244-531043

CIRCLE 782 ON READER SERVICE CARD

CD-ROM Networking Servers

- Multi-protocol
- Multi-network
- LanCD™ CD-ROM networking software
- License metering
- FastCD™ – SCSI cache
- Remote management
- Memory cache
- 255 drive support
- 100 concurrent users
- FULL ONE-YEAR WARRANTY

LOGICRAFT
A Subsidiary of IHS

1-800-880-5644

© 1994 Logicraft, Inc. • 22 Cotton Road • Nashua, NH 03063

CIRCLE 783 ON READER SERVICE CARD

PhoneDisc®
Finds People and Businesses Anywhere... Instantly!

No more thumbing through volumes of phone books to locate lost family, friends and sweethearts. Use the latest state-of-the-art CD-ROM technology to find new suppliers. Begin a job search. Plan a trip. Verify credit applications. Locate debtors. Plan sales routes. Check for trademarks. And much more! Accurate listings from Database America. Only the official PhoneDisc® gives you Best QUALITY, Best SOFTWARE and Best PRICE.

Winner: IIA Best CD-ROM. OPA Achievement in Business.

Updated quarterly to insure quality.

PhoneDisc® USA Residential
Search 80+ million residences by name Two disc set (Western & Eastern Regions). ONLY $99

PhoneDisc® USA Business
9.6 million U.S. Businesses on one disc. Search by name, SIC code, business type, address or phone number ONLY $99

BUY BOTH RESIDENTIAL & BUSINESS AND SAVE. ONLY $159

PhoneDisc® Reverse. Extend your search power! Same powerful search software as above plus telephone and address searching of residences. 90 million businesses and residences. Buy the U.S. on five disc set or your geographic region

SPECIAL OFFER 5 Disc set ONLY $349 *$129 for one region*

See your local dealer or call to order

CALL TO ORDER: **1-800-284-8353**

Digital Directory Assistance, Inc.
5161 River Rd Bldg 6
Bethesda MD 20816

CIRCLE 785 ON READER SERVICE CARD

Error-Free Duplication

- *High quality 3.5" & 5.25" color diskettes.*
- *Custom packaging & silkscreening.*
- *Warehousing & order fulfillment.*

CenTech's exclusive dual verification guarantees data integrity...

CENTECH DUPLICATION SERVICES

Call Toll Free... 1-800-255-3999
or FAX (801) 255-7555

CIRCLE 784 ON READER SERVICE CARD

For quality flowcharts, go with the name you can trust . . .
EasyFlow by HavenTree

Experience the speed and flexibility of flowcharting power made easy. EasyFlow takes the drudgery out of creating presentation quality flowcharts, organization charts and data flow diagrams. Powerful text handling features, export capabilities and shape creation make it the #1 DOS-based flowcharting program available today. But don't let all of this power fool you. EasyFlow still lives up to its name. If you don't believe us, give it a try. Its only $280 plus shipping and EasyFlow comes with a 60-Day Money Back Guarantee and FREE no-wait technical support.

Call today
1-800-267-0668 ext.49

HavenTree SOFTWARE

P.O. Box 470-P Fineview, NY 13640-0470
Tel: (613) 544-6035 Fax: (613) 544-9632

AD0009-930901

CIRCLE 786 ON READER SERVICE CARD

77 Million Telephone Numbers On CD-ROM.

Pull-up the name, address and number of an old friend. Call up a list of businesses then download them for marketing. ProPhone's 10,000 phonebooks on CD-ROM give you instant access to listings information you can use now!

1-800-99-CD-ROM

PROPHONE
The Ultimate Utility for CD-ROM.

CIRCLE 787 ON READER SERVICE CARD

The Multimedia Reference To America's Top Companies!

Choose from 2 Great Business CD-ROMs

Business 500 has comprehensive information on 500 major US companies plus interactive videos **Only $49.95**

Business Library contains the complete text of 12 top business reference books **Only $59.95**

MULTIMEDIA BUSINESS500

Other Allegro CD-ROM Titles:
Allegro PC Library - 30 Interactive PC Manuals Plus Videos
The Clinton Health Security Plan: What It Means - What It Costs
InPrint Art Library Vol 2: Graphic Photos & Scenic Photos
InPrint Art Library Vol 1: Graphic Textures & Cartoon Shapes

To order contact a dealer or call 201-808-1992

ALLEGRO NEW MEDIA

Your Best CDROMS!

Cica MS Windows CDROM	4000 new Windows programs - quarterly updates	
Giga Games CDROM	3000 hot Games for MSDOS and Windows	
Space and Astronomy CDROM	Thousands of NASA images and data files	
C User Group Library CDROM	A collection of user supported C source code	
Simtel MSDOS CDROM	Classic 650 MB Shareware / Freeware for MSDOS	
QRZ! Ham Radio CDROM	FCC Callsign Database for Win & DOS + files	
Gifs Galore CDROM	6000 mostly 640x480 GIF Images in every catagory	
Gutenberg Project CDROM	Classic Literature and historical documents	
Hobbes OS/2 CDROM	600 MB always current Shareware/Freeware for OS/2	
Source Code CDROM	650 MB of unix & DOS source code for programmers	
Internet Info CDROM	Thousands of computer, net, and internet documents	
X11/GNU CDROM	X Windows and GNU software for Unix and SPARC	
Aminet Amiga CDROM	650 MB new Shareware/Freeware for Amiga	
GEMini ATARI CDROM	650 MB 3000 Programs for Atari - also for BBS use	
Ada CDROM	Programming tools, Ada source code and docs	
Nova for NeXT CDROM	600 MB black NeXT app's, src., docs, etc	
Nebula for NeXTSTEP Intel	600 MB NeXTSTEP Intel app's, docs, etc	
Garbo MSDOS/Mac CDROM	MSDOS and Macintosh Shareware/Freeware	
Fractal Frenzy CDROM	2000 high resolution fractals - royalty free	
FreeBSD CDROM	Berkeley BSD 32bit O/S for PC, w/ GNU & X11. Src	
Linux CDROM	Yggdrasil Linux 32bit O/S for PC, w/ GNU & X11. Src	$ 49.95
La Coleccion CDROM	MSDOS, OS/2, Windows. Spanish descriptions	$ 39.95*
Sprite CDROM	Berkeley's experimental Distributed OS for Sun's	$ 29.95
CDROM Caddies	Standard type, highest quality, Lifetime guarantee!	$ 4.95

* Shareware programs require separate payment to authors if found useful

1-800-786-9907
+1 510 674-0783
Email: orders@cdrom.com
Fax +1 510 674-0821

Walnut Creek CDROM 4041 Pike Lane, Suite D 512 Concord CA 94520

All these CDROMs are unconditionally guaranteed!

VISA

Dealer Inquiries Welcome

CIRCLE 790 ON READER SERVICE CARD

Windows Training for Corporate Users

KeyStone Videos will teach your staff in Windows

Your Personal Windows Video Training Specialists

Dawn Bjork
Corporate Trainer
& MS Word Instructor

Alison Balter
Corporate/Government Trainer
& Borland Instructor

Dave Bellamy
MS Excel Specialist
& MS Project Instructor

Jeanie Johnson
Certified WordPerfect Trainer
& WordPerfect SIX.0 Instructor

Russell Eubanks
MS Certified, Visual Basic
Developer and Trainer

Word 6.0		Quattro Pro 5.0		Excel 5.0	
Beginning	$49.95	Beginning	$49.95	Beginning	$49.95
Intermediate	$49.95	Intermediate	$49.95	Advanced	$49.95
Advanced	$49.95	Advanced	$49.95	4.0 to 5.0 Upgrade	$49.95
2.0 to 6.0 Upgrade	$49.95	Paradox 4.5		Project 3.0	
Access 1.1		Beginning	$49.95	Beginning	$49.95
Windows 3.1		Advanced	$49.95	Advanced	$49.95
Beginning	$49.95	CorelDRAW 4		FoxPro 2.5 Windows	
Advanced	$49.95	Beg/Int/Adv	(on) $59.95	Basics For Tootsies	$49.95
DOS & Win Basics	$49.95				

WordPerfect SIX.0		Visual Basic 3.0	
Beginning	$49.95	Unit 1	$89.95
Intermediate	$49.95	Unit 2	$89.95
Advanced	$49.95	Unit 3	$89.95
5.2 to 6.0 Upgrade	$34.95	Includes Workbooks	
PowerPoint 3.0		Microsoft Office	$798.95
Beginning	$49.95	Microsoft Office Pro	$495.95
Advanced	$49.95	Microsoft Office Plus	$579.95
		Borland Office	$349.95
		Borland Office Lite	$239.95

new products

Risk Free 30 DAY Money Back Guarantee

Average 1 hour & 45 minutes of instruction per video

Shipping $5.00 for the first two video tapes, plus $1.50 for each additional video tape. International shipping additional

KeyStone Learning Systems

3 Easy Ways to Order: VISA C.O.D., Company P.O. or Checks

CALL 1-800-748-4838 801-375-8680 FAX 1-801-373-6872 MAIL KeyStone Learning Systems 125 E. 300 S., Suite 205 Provo, UT 84606

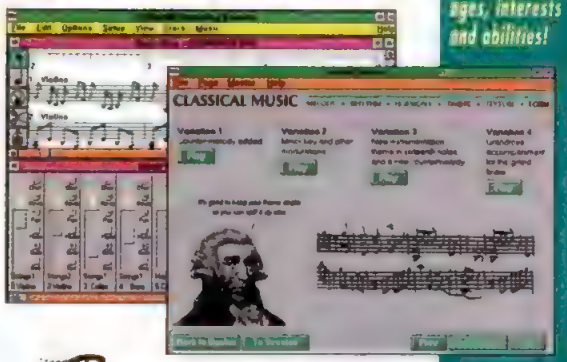
CIRCLE 789 ON READER SERVICE CARD

Great Music Comes to Life!

Through lively text, graphics and sound, **Music Mentor** introduces you to the fascinating world of classical music and music history. See and hear how composers express and the essential elements of classical expression come together to create the greatest music of all time.

Learn about these pieces then work with them in **Recording Session for Windows**, the easy-to-use MIDI recording and editing environment that delivers professional results.

Here's an integrated entertainment, education and creativity package for musicians of all ages, interests and abilities!



MICROSOFT WINDOWS COMPATIBLE

Music Mentor with Recording Session. $149.95

800-PRO-MIDI MIDISOFT

CIRCLE 791 ON READER SERVICE CARD

COMPLETE BIBLE BOOKSTORE ON DISK!

JUST DIAL

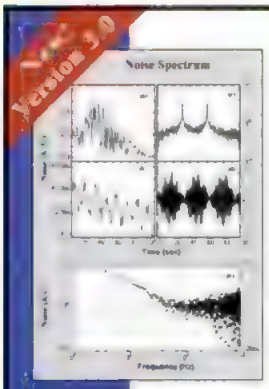
1-800-423-1228

FOR YOUR

Free Catalog!

BIBLE RESEARCH SYSTEMS

2013 WELLS BRANCH PKWY. #304 • AUSTIN, TEXAS 78728



ORIGIN

TECHNICAL GRAPHICS • DATA ANALYSIS • DATA ACQUISITION • WINDOWS

Origin is your complete laboratory data analysis and graphics software package for Windows. Designed by engineers and scientists, Origin offers an easy-to-use interface for importing, manipulating, analyzing and presenting your data. Origin was developed

For a Free Demo, Call

1-800-969-7720

CIRCLE 793 ON READER SERVICE CARD

The "Most Innovative" Software Of 1993 Is Also The Most Useful.

Plug in to POWER TRANSLATOR™ from Globalink®, the software package named "the most innovative of 1993" by *Discover Magazine*.

POWER TRANSLATOR features speeds up to 100 times faster than human translators, easily-updated dictionaries of over 250,000 words and phrases, and a 90%-plus accuracy rate!

Now, getting grammatically-correct translations of words, phrases or entire documents in Spanish, French or German to/from English is as easy as the push of a button.

Find out about the software package that's got *Discover Magazine*—and a lot of other people—talking. Call Globalink today and ask about POWER TRANSLATOR, your ticket to world-wide communication.

Globalink, Inc.

9302 Lee Highway, Fairfax, VA 22031-1206
Intl.: 1-703-273-5600
Fax: 1-703-273-3866

1-800-255-5660

U.S. and Canada

CIRCLE 792 ON READER SERVICE CARD

VIRUS ALERT

Introducing PC DEFENDER, the most complete anti-virus solution from the creators of the industry standard AMIBIOS. We've created the only hardware and software anti-virus package in its price range. PC DEFENDER protects your system from contamination before, during, and after booting.

PC DEFENDER comes with the Boot Monitor Card that protects your system from boot viruses, such as Michaelangelo, Azusa, Stoned, and others. The Illegal Activity Monitor protects you from viral activity WHILE YOU WORK! And, the Anti-viral Maintenance Utility allows you to scan, clean, and immunize your files, protecting you from any future corruption. With immunization, PC DEFENDER checks for corruption before your file executes. Suspect virus activity taking place? Get real protection ...get PC DEFENDER.

American Megatrends

Sales: (800) 892-6692
Fax: (404) 263-9381
Tel: (404) 263-8181
Fax Back: (404) 246-8787

CIRCLE 794 ON READER SERVICE CARD

Quickly... VIEW CONVERT PRINT

...your files independant of the host application

with... PANORAMIC!™ For Windows

PANORAMIC! for Windows is the ultimate Windows utility that lets you quickly view, convert, and print the contents of your files directly from your favorite file manager. With support for over 100 native file formats, this product is a must for every Windows user. Information sharing has never been so easy!

- view files in full WYSIWYG with the ability to zoom and pan for better views
- convert to many formats for use in different applications
- fully network compatible
- print and convert a single file or a batch of files directly from view mode, saving valuable time
- browse files then launch into the application with the selected file
- perform text searches and scroll to a specific page
- and many other useful features...

VIEW, PRINT, & CONVERT MULTIPLE FILES DIRECTLY FROM THE FILE MANAGER

OVER 100 NATIVE FILE FORMATS SUPPORTED

Word Processors: Word, WP, Ami Pro... **Spreadsheets:** 123, Quattro, Excel... **Databases:** dBase, FoxPro, Paradox... **Graphics:** GIF, TIFF, PCX... **CAD:** AutoCAD DWG, DGN... POSTSCRIPT, FAX, ARCHIVE: ZIP, ARC...and many more!

Call: 1-800-361-1904

Cimmetry Systems Inc. (C.S.I.)

tel: 514-735-1219
fax: 514-735-6480

CIRCLE 796 ON READER SERVICE CARD

TransferPro™ for MS Windows™

The Ultimate in Macintosh™ File Transfers

- **Read, Write and Format Macintosh media** directly from your PC, *also available for* SUN, SGI or HP
- User Friendly, fast and easy to use
- Makes it easy to format both Mac and DOS cartridges & floppies

Supports Many Media:

- Bernoulli® & SyQuest® cartridge drives
- Magneto Optical Drives
- Data Shuttle drives
- SCSI hard disk drives & diskette drive
- Floppy diskette

800-467-1459 • fax **505/662-0897**
tel. 505/662-1459
Digital InstrumentationTech., Inc.

Asian Distributor (Hong Kong)
Wilson Tech. Co.
fax 852-314-8114
tel. 852-314-8080

CIRCLE 795 ON READER SERVICE CARD

ARE YOUR HARDWARE LOCKS GIVING YOU TROUBLE

Numerous software programs on the market use electronic physical lock devices, presumably to prevent unauthorized execution. However if you experience a problem with your lock, you may incur costly hours of lost production time.

CAN YOUR BUSINESS AFFORD TO TAKE THE RISK!

SafeSoft Systems Inc. specializes in producing quality software and hardware products to eliminate the need for lock devices. Our products are designed as insurance to protect your software investment against costly downtime in the event your lock device is stolen, lost, damaged or fails. Lock devices are made from static sensitive CMOS circuitry that is subject to physical and human mishap.

P-CARD
will emulate the Sentinel Pro

C-CARD
will emulate the Sentinel C, Scribe

*Rainbow Technologies is not affiliated with SafeSoft Systems Inc. SentinelPro, SentiinelC and Sentinel Scribe are registered trademarks of Rainbow Technologies. All products are intended for licenced users.

DON'T TAKE UNNECESSARY RISKS!

TRY OUR INTELLIGENT PRINTER PORT

These intelligent printer ports will not only add or replace a regular printer port, but comes with intelligence to emulate most of the current *Rainbow Technologies lock devices.

SAFESOFT SYSTEMS
201-1111 MUNROE AVE.
WINNIPEG, MANITOBA
CANADA R2K3Z5
Ph. (204)669-4639 or
Fax (204)668-3566

CIRCLE 797 ON READER SERVICE CARD

WINDOWS

FREE ISSUE!

Inside Microsoft Windows is guaranteed to help you get the most out of Windows. But don't take our word for it. See for yourself.

Subscribe today and you'll get 13 issues for the price of 12 for only $39! If you decide *Inside Microsoft Windows* is not for you, mark "cancel" on your invoice and return it. Your free bonus issue will be yours to keep with no further obligation.

Call for your FREE ISSUE today!

1-800-223-8720

Please mention code V5NW

Explore the Internet!

DELPHI is the only major online service to offer you full access to the Internet. And now you can explore this incredible resource with no risk. You get 5 hours of evening/weekend access to try it out for free!

Use DELPHI's Internet mail gateway to exchange messages with over 10 million people at universities, companies, and other online services. You can even subscribe to mailing lists, with no per-message fees. Download programs and files from all over the world using "FTP" or connect in real-time to other networks using "Telnet."

To help you find the information you want, you'll have direct access to powerful search utilities such as "Gopher," "Hytelnet," "WAIS," and "the World-Wide Web." If these terms sound strange to you, don't worry; DELPHI has expert online assistants and a large collection of help files, books, programs, and other resources to help get you started.

Over 600 local access numbers are available across the country. Explore DELPHI and the Internet today. You'll be amazed by what you discover.

Attention Current Internet Users:

See what DELPHI can offer you! Stock quotes, Grolier's Encyclopedia, newswires, and hundreds of other services are just a few keystrokes away. Telnet to delphi.com and enter the username and password at right for a free trial.

5-HOUR FREE TRIAL!
Dial By Modem 1-800-365-4636
At Username, enter JOINDELPHI
At Password, Enter PCM43A

DELPHI

Questions? Call 1 800 695 4005 Send e-mail to INFO@delphi.com

CIRCLE 796 ON READER SERVICE CARD

ROM BIOS UPGRADES

• Support Windows 3.0/3.1 • Support 1.2 MB & 1.44MB Floppy Drives • User defined hard drive types • Support VGA • Novell & Netware compatible • Enhanced 101/102 keyboard • 100% IBM compatible • Complete documentation • DOS 5.0 • Latest Version • Complete set up in ROM • Free Intel Chip Puller

We are the oldest and largest BIOS upgrader in the world. Guaranteed lowest prices all the time.

• IBM • Acer • Leading Edge • DTK • Dell • Sperry • Northgate
• AST • AMI • Micronics • Hyundai • Sanyo • Samsung • Wells American
• Wyse • Kaypro • Compaq • Everex • Gateway • Tandy • Epson
AND MANY MORE

"SPECIAL OFFER"
Get a FREE copy of PCSAFE™ utilities package with every order. Retail value $149.95

ORDER TODAY
1-800-800-2467
MA,FL,CA OFFICES

UNICORE SOFTWARE
1888 Turnpike St. • North Andover, MA 01845
(508) 686-6468 • FAX (508) 683-1630

CIRCLE 799 ON READER SERVICE CARD

ANNOUNCING
Computer Select™

The Most Complete Database of Computer Product Information Available

With COMPUTER SELECT you'll never again risk making the costly mistake of acquiring the wrong product. Now, using your own PC, you can identify, evaluate and select the best products that meet your requirements and your budget. Easy-to-use search software lets you quickly retrieve the documents you need from the vast database of product reviews, specifications, announcements and buyer's guides.

Get instant access to more than...
- 70,000 articles and abstracts each month
- Complete specs for 70,000 hardware, software and communications products
- Profiles of 12,000 companies, including addresses and phone numbers
- 9,000 definitions of computer and telecommunications terms.

Discover the power of this new CD-ROM product. Call now for your free, no-obligation demo disk. Then, if you wish, you can subscribe for $995.*

LIBRARY™
One Park Avenue,
New York, NY, 10016

CALL NOW FOR A FREE DEMONSTRATION DISK
212-503-4400

Computer Library and Computer Select are trademarks and Data Sources is a registered trademark of Ziff Communications Company ©1991 Ziff Communications Co.
*U.S. and Canada only. Outside U.S. $1195

DeLORME
MAPEXPERT™

Version 2.0 — Completely Revised and Updated!

Your Route to Increased Productivity

MapExpert — a professional desktop mapping program — gives you a street-level map database of the entire United States, and the tools to customize and print high quality maps for any business need. One CD-ROM lets you:

- Locate areas by zip code, phone number, or place name
- Zero in on individual streets anywhere in the country
- Identify address ranges in major metropolitan areas
- Customize maps with graphic and text overlays
- Find latitude and longitude for any location
- Print high-quality maps in color or B&W
- Print mural maps...and more!

MapExpert's uses for increasing your business productivity are endless. Define delivery routes, outline sales territories, map out expansion strategies, plan property development, make nationwide travel plans, and more!

Now Only $295 Direct
Suggested Retail Price $495

Order Today
800-452-5931 ext. 8153
30-Day Money-Back Guarantee

PC "...MapExpert is an amazing bargain."

DeLorme Mapping Company, Lower Main St., Freeport, ME 04032

CIRCLE 800 ON READER SERVICE CARD

Is the pressure on to justify how you spend your training dollars?

In these days of tight budgets, you need solid proof of the value of training.

That's why Logical Operations has developed the Skills Evaluation Series™: software-skills tests that you can use to assess basic software skills, screen to determine training requirements, and measure training effectiveness.

Each Skills Evaluation contains 20 multiple-choice questions with a manually or automatically scored answer card. Most evaluations are "hands-on," where students must be using the actual software and the sample files provided in order to complete the evaluation.

Fully validated, and designed to work with Logical Operations' classroom training materials (if you use them!), Skills Evaluations are available for most major software applications including, **Word for Windows, WordPerfect 5.1, Macintosh Orientation System 7, PC Literacy, 1-2-3 Release 3.1, Windows 3.1 Orientation, and Excel 3.0 for Windows.**

At only $78 for a Skills Evaluation Starter Package, you'll get an information-packed Administrator's Guide, answer key, and a 10 pack of tests. Additional 10 packs are available for $50.

Skills Evaluation Series™

Order now — it might prove to be the most cost-effective thing you'll do today. **Call 1-800-456-4677, ext. 40 to receive a FREE evaluation,** and prove the value of your training today.

Logical Operations
Learn from us

Skills Evaluation Series is a trademark of Logical Operations. All other copyrights are trademarks or registered trademarks of their respective owners.

CLASSIFIED

PCMCIA direct to you

Type I, II, III

Megahertz

FAX MODEM (2400, 9600, 14,400)

FLASH CARD (10mb, 20mb, 40mb)

HARD DRIVE (40mb, 80mb, 100mb)

ETHERNET (10Base-T, Coax, Combo)

AND MORE . . .

PCMedia

46560 Fremont Blvd., Suite 109
Fremont, CA. 94538 U. S. A.
Tech. Support (510)490-8478, FAX (510)490-8613

Please call for latest price!

800 633 4272
800 MEDIA PC

VISA

CIRCLE 551 ON READER SERVICE CARD

CD-ROM Mini Tower

These CD-ROM towers are configured with high performance, double speed Texel CD-ROM drives. Texel drives are recognized globally for their superior data transfer rate and access speed. They resist their environment contamination; feature dust proof construction; are CD-XA ready; Kodak Photo CD Multisession compatible and are SCSI-2 compliant.

Boffin Towers come with...

- Internal SCSI cabling
- Mounting rails
- CD caddies
- External SCSI cable
- One year limited warranty

Network Ready 4 Bay Towers *starting as low as* **$2595.00**

Featuring COREL Network Manager with CD-ROM Network Loadable Module (NLM)

COREL SCSI! APPROVED PRODUCT

4, 5, 6 and 7 Bay Models available
Can also be configured with Toshiba CD-Rom Drive at additional cost

BOFFIN LIMITED

612-894-0595
FAX: 612-894-6175

2500 W. COUNTY RD. 42 • #5 • BURNSVILLE, MN 55337

CIRCLE 553 ON READER SERVICE CARD

DOLPHIN MICROCOMPUTER CORPORATION

1234 SOUTH ST. LONG BEACH, CA 90805
TEL: 310-422-4444
FAX: 310-422-7878

XT 12MHZ 1MB RAM 40MB MONO SYS	$455
286 25MHZ 1MB RAM 40MB VGA MONO SYS	588
386SX 33MHZ 4MB RAM 130MB SVGA SYS	999
386 40MHZ 4MB RAM 130MB SVGA SYS	1099
486SX 25MHZ 4MB VESA 130MB SVGA SYS	1233
486 33MHZ 4MB RAM 170MB SVGA SYS	1456
486 50MHZ 4MB RAM 200MB SVGA SYS	1666
486DX2 66MHZ 4MB VESA 200MB SVGA SYS	1834
TWINHEAD NOTEBOOKS ALL MODELS	Call
ACER COMPUTERS ALL MODELS	Call
MOTHERBOARDS 386SX, 386DX, 486	Call
W. DIGITAL WD2200 212MB IDE HD	281
W. DIGITAL WD2250 255MB IDE HD	303
W. DIGITAL WD2340 340MB IDE HD	439
CHINON 1.2MB FLOPPY DRIVE 5.25"	48
CHINON 1.44MB FLOPPY DRIVE 3.5"	45
FUJITSU 101 CLICK KEYBOARD	41
NANAO 9080i, F550i, T560i, 9400i, T660i, F750i	Call

CIRCLE 555 ON READER SERVICE CARD

HIGH TECH DIRECT INC.

Special/Limited Qty!!
14.4 int Fax/Modem
$99.00
No Dealers, limit 3 per customer
IBM-Compaq-HP

Toll Free Order Line
800-777-7058
Info: 415-508-7806
Fax: 415-508-7805
Visa/MC/COD

284 Harbor Blvd. Belmont, CA 94002

CIRCLE 552 ON READER SERVICE CARD

Wanted: Used PCs!

We'll pay you cash for the following brands of used PC equipment:

IBM • Compaq • Apple
AST • Hewlett Packard
Any brand of Notebook/Laptop

Call for a free quote.

We don't buy brands other than those listed above!

We also sell refurbished PCs at discount w/1-year warranty. Call for current pricing!

Call 800-545-2313 "We're in the NYNEX Yellow Pages"

RENTEX

Quality & Service Since 1980

CIRCLE 608 ON READER SERVICE CARD

LOW WAREHOUSE PRICES!

1MB SIMM 70ns $38 4MB SIMM 80ns $149

TYPE	PKG.	100ns	80ns	60ns
256K x 4	DIP		$5.25	$5.35
1M x 1	DIP	$5.35	$5.75	$6.50
256K x 9	SIMM	$8.99	$11.20	$12.99
		80ns	70ns	60ns
1M x 9 3 chip	SIMM	$40.00	$38.00	$41.00
1M x 9 9 chip	SIMM	$42.00	$43.00	$46.00
4M x 9 9 chip	SIMM	$149.00	$149.00	$155.00
1M x 36 72pin SIMM			$169.00	
4M x 36 72pin SIMM			$629.00	

MATH CO-PROCESSORS/CPUs

ODP486-DX2	50MHZ	INTEL	$359.00
486DLC-33	16-33MHZ	CYRIX	$74.00
486DLC-40	40MHZ	CYRIX	$145.00
83SX87	16-25MHZ	CYRIX	$56.47
83SX87	33MHZ	CYRIX	$67.29
83DX87	16-33MHZ	CYRIX	$63.52
83DX87-40	40MHZ	CYRIX	$73.00

CALL FOR SIPPS AND CACHE MEMORY!

408-559-0603
FAX 408-559-0301

2859 Camden Ave., #330 San Jose, CA 95124

FTI Flash Technology Offers High Quality & Low Prices

Basic Systems:

386/40,128K	$365
486DLC/40,128K	$445
486DX/33,256K, VESA	$660
486DX2/66,256K VESA	$890

Basic System Includes:
- Motherboard
- 4MB Memory
- Mini Tower Case 200W PS

Notebook Computer:

486SLC/33	$1425
486DX/33	$1770
486DX/33 Passive	$2280
486DX/33 Active	$3595

All Notebook Includes:
- 4MB Memory, 80MB HD
- 1.44MB Floppy, Trackball Mouse
- Battery Adapter, Carrying Bag

Supercom Monitors:

14" VGA B&W	$96
14" SVGA (0.28)	$245
14" NI SVGA (0.28)	$265
15" NI SVGA (0.28)	$350
17" NI SVGA (0.26)	$695

Motherboards:

386SX/40		$70
386DX/40,128K		$140
486DLC/40,128K		$210
IBM	486SLC2/66 VESA	$370
Intel	486DX/33 VESA	$420
Intel	486DX2/66 VESA	$645
Intel	486DX2/66 EISA	$700

Case/Power Supply:

Mini Tower Case 200W	$45
Desktop Case 200W	$55
Mid Tower Case 230W	$70
Full Tower Case 230W	$95

1-800-448-2031

We offer 30 day moneyback & 1 year parts & labor warranty.
PO, COD & major credit cards accepted.

Flash Technology Inc.
55 W. Hoover Ave
Mesa, AZ 85210
Tel(602)464-9272
Fax(602)464-9856

CIRCLE 554 ON READER SERVICE CARD

486

Upgrade slow 386 with
486 50 or 66 Mhz
motherboards* from $198.
*Made by IBM-3 year warranty.
486 Systems from $698.
1 Year Parts, Lifetime labor warranty
MONEY BACK GUARANTEE
For immediate information any time call (718) 335-9725 from your fax and request document number 8101
Fulmark 73 Spring St. #407 NYC 10012
1 (800) FULMARK or
(212) 274-1194, fax 274-0803

$198

CIRCLE 557 ON READER SERVICE CARD

CRU DataPort™

Removable Storage Module

Accepts standard 3.5" hard disk drives

- Versions for MFM/RLL, SCSI, and IDE
- Use in a variety of CRU and other enclosures
- "Ruggedized" for high reliability
- FCC verification

SECURITY/PORTABILITY/BACKUP

Remove your hard disk to prevent theft or unauthorized use. Transport your disk easily from one host computer to another. Store "ready-to-run" backup in a secure location

Features the same rugged and reliable removable data storage unit used in the new CRU DataRAID™ fault-tolerant disk array system

CRU Distributors: Tech Data, Gates/FA, C.B.C., D.S.S., Comstor, Arrow Electronics, Mini Micro.

Simply the best!

U S Patents 4,941,841 and 308,052

CRU CONNECTOR RESOURCES UNLIMITED, Inc.
Tel: 408-957-5757 • Fax: 408-942-0862

CIRCLE 558 ON READER SERVICE CARD

80MHz The fastest 486 available!

Full 3 year warranty.

486 DX/80 MHz Vesa Local Bus.....$2,995

256K Cache, 16MB RAM,340MB IDE,Dual Floppies, 2 S, 1P, 1G. VGA Windows Accelerator 1MB on VL-Bus, SVGA 15"color monitor 1024x768 .28mm non-interlace, 101-key Keyboard, MS-DOS 6.0, Windows 3.1. +Mouse.

XYLON

Custom Systems built right for your needs... right now!

All systems FCC class B approved

199 LaFayette Drive
Syosset, NY 11791
(516) 921-0900

Call: (800) 883-0900
Fax: (516) 921-0977

CIRCLE 560 ON READER SERVICE CARD

PENTIUM – 60 MHz

Since 1985, MSE has been dedicated to bringing you high-quality American designed, engineered and built computer systems for a wide range of applications. Now, for our 9th anniversary special, we are proud to introduce our fastest and most powerful machine. The Pentium – 60/66 MHz.

Low Cost Intel 486SX-25 MHz VLB $695

- Mini-Tower Case, 32 Bit CPU
- Upgradeable to DX2-66Mhz
- 4 MB RAM, expands to 32 MB
- 125 MB Fast Drive (15ms)
- 1 44 MB Floppy Drive
- 2 Serial/Parallel
- Enhanced Keyboard
- 128k Write Back Cache
- 33Mhz add $50

MSE VL 486DX-33 MHZ

- 80486DX-33 CPU, 4MB RAM
- 1 44MB Floppy Drive
- 210MB Fast Drive (12ms)
- 128k Cache
- Enhanced Keyboard
- 50MHz DX2 add $100
- 66MHz DX2 add $200

$895

PC MAGAZINE

"When I'm ready to buy a 33MHz 486 ISA machine, MS Engineering's MSE 486ISA 50MHz would be a wise choice. It's not hard to do business with them."

PCI 486 DX2-66 MHz

- 8 MB Ram, 128 K Cache
- 340 MB 12 ms Hard Disk
- PCI SCSI II W/16550 Port
- PCI S3 SVGA 1 MB
- 14" SVGA .28 Monitor
- 101 Key Keyboard

$1995

Motherboard Special

- 486SX-25MHz w/4MB RAM **$399**
- 386-33MHz w/128k Cache/4MB RAM **$349**
- 486-33MHz w/128k Cache/4MB RAM **$599**
- 486-50MHz DX2 w/128k Cache/4MB RAM **$899**
- 486-66MHz DX2 w/128k Cache/4MB RAM **$799**
- 486 PCI-66MHz w/128k Cache/4MB RAM **$999**
- 486 EISA-66MHz w/128k Cache/4MB RAM **$999**
- Pentium-60MHz w/256k Cache/4MB RAM **$1599**

Power PC I Pentium P5-60 MHz

- Mini-Tower Case, 64 Bit CPU
- 4MB RAM, 256k Cache
- 1 0 GB SCSI II Hard Drive
- 1.44MB Floppy Drive
- Enhanced 101 Keyboard
- 3 PCI Slots

$2495

Hard Disk SCSI-II

- Micropolis 3.0GB MC-1936 **$2499**
- Micropolis 2.0GB MC-1924 **$1999**
- Micropolis 1 7GB MC-2217 **$1299**
- Toshiba 1.0GB **$799**
- Quantum 525MB **$549**
- Maxtor 340MB **$349**

CD & Multimedia SCSI/NT Compatible

- NEC CDR-84 JD-1 **$369**
- NEC SCSI Host Adapter **$99**
- NEC CDR-74-1 **$599**
- Adapter VL-SCSI II **$299**
- Pro Audio Spectrum 16 **$149**
- Toshiba CD-3401 (200ms) **$369**

VESA Local Bus

- Micronics 486 DX-33 MHz VLB W/4MB **$799**
- Micronics 486DX2-66MHz VLB w/4MB **$999**
- Orchid S3 VLB 1MB **$149**
- ET-4000 W 32 VLB 1MB **$129**
- Weitek P9000 VLB 2MB VRAM **$399**

PCI Local Bus

- PCI 486DX-33MHz w/4MB **$799**
- PCI 486DX2-66MHz w/4MB **$999**
- PCI S3 w/1MB **$169**
- PCI motherboard includes: PCI IDE/SCSI/ 16550 UART on board

Sales Hours:
Monday - Friday
9:00 AM - 5:30 PM
Saturday
10:00 AM - 3:00 PM
PST

Prices subject to change w/o notice.

MS ENGINEERING, INC.
10601 S. De Anza Blvd., Suite 214, Cupertino, CA 95014
(408) 257-4249 FAX: (408) 257-4388

486, 386 and SX are trademarks of Intel Corp

CIRCLE 559 ON READER SERVICE CARD

PC Magazine's New Classified Format puts your ad in front of 1,000,000 buyers of computer products and services at new, surprisingly affordable cost-per-inch rates.

PC MAGAZINE

Call your account representative today at:

1-800-825-4237

800 275-9924

CRI Hallbrook, NY

ALL MAJOR BRANDS

IBM Thinkpad 350C/125/260	$2599/2999
IBM Thinkpad 750C	CALL
HP Laserjet IV/IVM	$1349/1899
HP Laserjet 4P/4MP	$999/1389
HP Scanjet IIP/IICX	$799/985
HP 1200C/1200CPS	$1399/1899

HEWLETT PACKARD COMPAQ TOSHIBA

Contura 486/25 120/209	$1975/CALL
Contura 486/25C HD 120/209	CALL
LTE 486/33Color	CALL
Prolinea 4/25s 4/120/w/w+	$1059
Prolinea 4/33s 4/120	$
Prolinea 4/33 4/120	CALL
DESKPRO/PROSIGNIA8	CALL

SOFTWARE

WORDPERFECT WIN/DOS	$269/269
Geneva Cad3.0.1	$269

Lotus		SYMANTEC	
2.4	$309	N. Antivirus	$99
3.4A	$369	N. Utilities	$99
4.01 Win	$299	N. Desktop Win	$115
Smartsuite	$349		

Borland			
Dbase IV 1.5	$469	C++/App	$469
Dbase IV 2.0	$479	Paradox 4.0	$489
C++	$325	Paradox 4.5	$539

Prices Reflect Cash Discount. Prices subject to change due to market conditions. Product Names are Trademarks or Registered Trademarks of their manufacturers.

Phone 516-737-0600 Fax 516-737-0023

CIRCLE 561 ON READER SERVICE CARD

EXCEL INTRODUCES
DESKTOP DEMON
486SX - 25
210 MEG hd...4 MEGS ram
14" SVGA Color Monitor
3.5 & 5.25 Floppy • 101 Keyboard
Mouse • Mini-Tower Case
DOS 6.0 & Windows 3.1
2 Years Warranty (Parts & Labor)

AMERICAN EXPRESS VISA MasterCard DISCOVER

$1,099.00

(609) 653-9595

Excel Computers

SEND $2.00 FOR OUR CATALOG:
P.O. Box 706 Absecon, N.J. 08201
Laurel Dr. Somers Point, N.J. 08244

CIRCLE 562 ON READER SERVICE CARD

AUTOMATE
Your Business
...With Point of Sale

BASIS™ (Since 1987)
POINT-OF-SALE & INVENTORY CONTROL

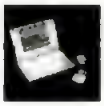
- Affordable & Easy to use
- Amazingly powerful software
- Your solution to customer tracking, inventory control & reports
- Fully integrated with scanners, cash drawers, receipt printers, bar code printers & portable readers
- We provide the Hardware/Software solutions
- Nationwide Technical support provided

Valencia Computers
28309 Avenue Crocker, Valencia, CA 91355
(805) 294-6313
***M/C & Visa ***Easy Financing

CIRCLE 565 ON READER SERVICE CARD

ITS Your One Stop Source for Bar Code Solutions ITS
Quality • Performance • Value

Low Cost Software Reader NEW!



- Eliminate external box with decoding software.
- No power supply needed for notebook/ laptop.
- Windows, RS- 232 and PC Wedge Version.
- Applications include: Field Sales/Order entry and inventory, document tracking and shipping and receiving.

Select the Scanner You Need

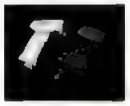
- All types, configurations, sizes.
- Largest selection of Hewlett-Packard wands available.
- Lasers, CCD, slot, wand and POS/Retail Table-Top scanners. NEW!
- HP wands with built-in decoders.

Easy-to-Use Labeling Software

- For all dot matrix, laser, and bar code printers.
- Available for Windows and easy to use.
- Suppliers of Zebra and Sato bar code printers.

NEW! Low Cost, High Performance, Compact Magnetic Stripe Readers

- Versatile: Tracks 1,2,3,
- Bi-directional and durable.
- Excellent for retail and industrial usage.
- RS232 and PC Wedge versions and encoders.



Value Packed Portable Terminals NEW!

- Easy to upload data and to program.
- MS-DOS compatible terminal available.
- Multi-memory options, battery backup.
- Applications include: Inventory Control and Retail/point of sale.
- Programmable as a printer driver.

Bar Code Readers for IBM Compatibles, Mac, RS-232, Network Industrial Terminals, DEC, WYSE, IBM, HP, and other Hard-to-Find Interfaces

- Plug and play. • Easy Setup.
- No software needed.
- Multi-input versions available.

Call About Our 30 Day Money Back Guarantee! Variety of Payment Options! • Toll Free Technical Support! Next Day Delivery! • Over 100,000 Satisfied Users! Technical Support! Full 2 Year Warranty on Readers and Wands!

International Technologies & Systems
9201 Forest Hill Avenue, Suite 108, Richmond, VA 23235 • 655K No. Berry St., Brea, CA 92621
CALL USI Eastern USA (800) 826-1688 • Western USA (800) 228-9487
International Call 804 272-0138 • FAX 804 272-0357 • (714) 990-1880 • FAX (714) 990-2503

CIRCLE 563 ON READER SERVICE CARD

BAR CODE EXPERT

IBS

- Keyboard wedge readers for PC, XT, AT, PS/2, Mac, Terminals. No software change required
- Readers w/RS-232, RS-422, DTMF output and multidrop protocol
- Reads UPC, EAN, Code 39, 11, 128, Interleaved 2 of 5, Codabar, MSI
- Wand, Slot, CCD, Laser, Magstripe
- Reader w/steel wand - from $298
  Bar code labeling S/W - from $99
- Direct from manufacturer
- 30 day money back guarantee
- Reseller's Discount available
- **Fingerprint verifier**
- Please call for free catalog

800-765-2271
IBS-Intelligent Barcode Systems
16031 Kaplan Ave., Industry, CA 91744
Tel:818-968-6265 · Fax:818-968-5527

Now You Can LAN Bar Code Solutions!

New LANpoint® PC's

- Simple application development with DOS-based tools
- Connect directly to NetWare®, LANtastic®, LAN Manager, and TCP/IP Networks
- Built-in bar code and mag stripe capabilities
- Select from three package designs:
  - Compact size: 9.0"W x 5.0"H x 1.5"D, 1.7 lb.
  - Heavy-duty FACTORYpoint™ resists water, chemicals, and dust
  - TIMEpoint™ for Time & Attendance/Access Control features built-in badge reader

BURR-BROWN®
LANpoint Systems® Division

yes It runs with NetWare®

To receive your FREE copy of "Using Bar Codes on a LAN" or to learn more about LANpoint, call (800) DataLAN or fax (602) 741-4245

LANpoint®, FACTORYpoint™, TIMEpoint™, LANpoint Systems®, Burr-Brown Corporation. NetWare®, Novell, Inc., LANtastic®, Artisoft, Inc
Developer Tested Only Novell makes no warranties with respect to this product

CIRCLE 564 ON READER SERVICE CARD

PORTABLE PRODUCTS™

YOUR COMPLETE SOURCE FOR BAR CODE AND HANDHELD DATA COLLECTION SYSTEMS

- BARCODE READERS — Keyboard wedge, RS-232, PC, Mac, Most data terminal interfaces
- INPUT DEVICES — Laser, CCD, Wand, Slot-Magstripe — All available with built-in decoder
- PORTABLE HANDHELD READERS — DOS & Windows Application Generators — No programming experience needed Develop your Application in minutes
- Printers, Verifiers, Label Software, Labels, Custom Cases, Custom Software Development, Systems Integration. Complete Systems

FREE UNLIMITED 800 TECH SUPPORT
UNCONDITIONAL SATISFACTION GUARANTEE
CALL FOR FREE CATALOG
1-800-849-0958

PORTABLE PRODUCTS™
A Division Of International Systems Group Inc
8401 K Mayland Drive • Richmond VA 23294
phone 804 346-0111 • fax 804 346-0196

CIRCLE 566 ON READER SERVICE CARD

Bar Code Headquarters

Labeling Software
For Dot Matrix or LaserJet

Windows Version!

- Any Format, Any Size Label
- WYSIWYG or Text Design
- Easy, Powerful
- **Formats for Sears, K-Mart, Penney's, WalMart, TCIF, Logmars, AIAG, etc.**
- Bar Codes: UCC-128, UPC/EAN, 2of5, MSI, 11, Codabar, Code 128, and Code 39
- Big Text and PCX Graphics too!
- Powerful, Versatile, Easy to Use
- Imports ASCII data files from dBase, etc.
- LabelRIGHT™ for Windows – **$379**
- Above Label Printed by LabelRIGHT™ – **$279**

Cordless Radio Frequency Bar Code Reader

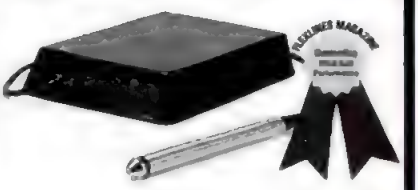
- For IBM or Macintosh
- Keyboard or Serial Attach
- No Software Needed
- Wireless range up to 100'
- Optional Pocket Beeper
- No License Needed
- FCC Approved
- Optional Pocket Beeper – **$255**
- Base Station, Cable, and Wand – **$495**

Portable Bar Code Readers
for PC,XT,AT,PS/2,Macintosh, and Serial Interface Computers

With Voice!

- Battery Operated Reader — 64K or 256K
- Kybd or Serial upload
- **User's voice messages tell operator what to do at specified errors and at data entry steps. Messages are pre-recorded by microphone and broadcast thru built-in speaker or earphone. EASY! Any language.**
- Wand, CCD or Laser Input
- UPC/EAN, 128, 2of5, MSI, Code 39, etc.
- Real Time Clock for date/time stamps
- Double duty as Non-portable Reader
- **Very Easy to Program!** Custom Prompts.
- 64K Unit with Wand & Voice – **$799**
- 256K Unit with Wand and Voice – **$899**

Bar Code Readers
for PC, XT, AT, PS/2, Mac and RS-232 Terminals



- Attaches as 2nd Keyboard
- UPC/EAN, Code 128, 2of5, MSI, Code 39
- Wand, Magstripe, CCD, Slot Badge or Laser
- All European Keyboards Supported
- Superior Read Rates. Made in USA.
- **Top Rated by Independent Reviews**
- Complete with Laser Scanner – **$1250**
- Complete with CCD Scanner – **$624**
- Complete with Stainless Steel Wand – **$399**

Ordering is Easy!

Call for our Free Catalog

- **Made in the USA**
- **Free "800" Support**
- **Qualified P.O's Accepted**
- **2 Year Warranty on Readers**
- **Same Day Shipping**
- **Free UPS Blue in US**
- **30 Day Money Back Guarantee**

In US or Canada Call Toll Free

800-345-4220

Worthington Data Solutions
3004 Mission Street • Santa Cruz, CA 95060
FAX 408-458-3994 • Phone 408-458-3928

WORTHINGTON
DATA SOLUTIONS

BAR CODE
Software for Windows

- **Easy-to-Use**
- **True Graphics - Not a "Font"**
- **Paste Into Any Windows app.**
- **Full DDE Support**
- **Rotation. Text. Color**
- **Fully Scalable. •WYSIWYG**
- **90-Day Guarantee**

Only $199. Call for Info.

800 SCAN 004

Code 39, 128, 93, UPC, EAN, 2of5, Postal Codabar, PDF417, etc.. 17+ Symbologies

T A L

T.A.L. Enterprises, 2022 Wallace St. Philadelphia, PA 19130. (215) 763-2620

CIRCLE 567 ON READER SERVICE CARD

BAR CODE PRINTING AND READERS

BEAR ROCK
MEANS BAR CODES
1(800)232-7625

- **Bear Rock Labeler™** for Windows.™ Label and envelope design software with full bar code support.
- **PrintBar.™** Precision bar code fonts for Macintosh™, Windows™ or OS/2.®
- **PrintBar II.™** DOS memory-resident bar code printing program for PC's.
- **CodeScan.™** Bar code readers. 30 day evaluation, 5 year warranty.

Ask about special discounts!

1-800-232-7625

Bear Rock TECHNOLOGIES

4140 Mother Lode Drive • Shingle Springs, CA 95682
(916) 672-0244 • FAX (916) 672-1103

THE BARCODE LEADER DOES IT AGAIN...

KEYBOARD WEDGE SOLUTIONS!

HAND-HELD LASER GUN **$895**

FREE BARCODE PRINTING/CREATION SOFTWARE WITH LASER PURCHASE

STAINLESS STEEL WAND **$279**

800 TECHNICAL SUPPORT
30 DAY MONEY BACK GUARANTEE
SAME DAY SHIPPING
2 YR LASER SCANNER WARRANTY

DATAVISION
30 INDIAN DR IVYLAND PA 18974
10421 BURNHAM DR GIG HARBOR WA 98335

1-800-486-0620
EAST COAST
1-800-486-9585
WEST COAST

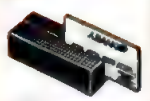
CIRCLE 568 ON READER SERVICE CARD

BAR CODE READERS

AMERICAN MICROSYSTEMS

2190 Regal Pkwy. • Euless, Texas 76040 • (817) 571-9015

FOR PC, XT, AT, PS/2 & TERMINALS:



MAG STRIPE

SLOT (BADGE)

WAND

LASER

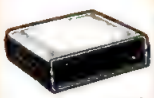
CCD

METRO LASER

- No software changes required
- Data appears as keyboard input
- Reads Code 39, I-2of5, UPC/EAN, Codabar 11, 93, 128, MSI/Plessey
- Auto-discriminates between codes
- Accepts WAND, SLOT, MAG STRIPE, CCD, LASER
- Easy To Use

BAR CODE PRINTING SOFTWARE:

- For Epson, OKI, IBM, Dot Matrix and HP LaserJet Printers
- Prints Code 39, I-2of5, UPC/EAN, Codabar, 128, 93, 11, MSI/Plessey



DECODER BOX

PORTABLE READERS:

- Use as a portable, wedge or terminal
- Input Devices: WAND, CCD, or 5V LASER
- Real-time clock for date and time stamps
- Automatic power off with resume
- "Built-In" Inventory programs
- 54 key alpha/numeric keyboard
- Supports HAYES compatible modems

(800) 648-4452 • FAX: (817) 685-6232

30 Day Money Back Guarantee

One Year Warranty

HARD DRIVE WHOLESALERS

OTHER DRIVES IN STOCK CALL NOW!

261MB IDE $217

CONNER IDE DRIVES			
CFA-170A	170MB	17ms	$199
CFS-210A	213MB	14ms	$229
CFA-340A	343MB	13ms	$292
CFS-420A	426MB	14ms	$380
CP-30544	540MB	10ms	$607

SEAGATE IDE DRIVES			
ST-3145A	131MB	16ms	$169
ST-3243A	214MB	16ms	$199
ST-3290A	261MB	16ms	$217
ST-3390A	341MB	12ms	$305
ST-3550A	452MB	12ms	$411

QUANTUM SCSI DRIVES			
PD-525S	525MB	10ms	$617
PD-1050S	1.05GB	10ms	$909
PD-1225S	1.22GB	10ms	$1,029

SEAGATE SCSI-2 DRIVES			
ST-31200N	1.05GB	10ms	$879
ST-42100N	1.9GB	13ms	$1327
ST-12400N	2.1GB	9ms	$1550

408•559•1773 FAX: 408•559•0823

2059 Camden Ave, #333 San Jose, CA 95124

All drives 100% guaranteed. We accept VISA, MC, Discover, COD's and company PO's with prior approval. Prices, delivery & manufacturers subject to change. Returns require RMA; non-defective returns subject to a 15% restocking fee.

Exec-Amort™ - Loan Amortizer +

Accurate Benchmark Used Worldwide!
Favorite of banks & attorneys
Over 6500 sold!

- ✓ Loan Amortization Reports
- ✓ 18 Digit Accuracy
- ✓ Creative Financing
- ✓ Instant Changes
- ✓ Fixed or Adjustable Interest Rates
- ✓ APR calc to US Reg. Z
- ✓ Bi-weeklys & more
- ✓ Prepaid Interest
- ✓ Points, Fees, PMI
- ✓ Irregular Payments
- ✓ Balloon Payments
- ✓ Negative Amortization
- ✓ 360 or 365 or 360/365 day interest
- ✓ Solve for an Unknown
- ✓ Store loan to disk
- ✓ Report titles
- ✓ No Spreadsheet required
- ✓ Context help screens
- ✓ Menu Driven

Single User Price $149.95
5 User Network Version Price $450.00
Order Today Call 800/858-8448
Fax Orders Call 313/791-3010
Phone (313) 791-0770

Electrosonics
36380 Garfield, Suite 1
Clinton Township, MI 48035 USA
Demo $10, VISA, MC, AMEX, Discover
Ground Ship $5, Air $13, COD's add $4.50
International add $25

CIRCLE 571 ON READER SERVICE CARD

PC MAGAZINE INDEX

1993 – $15
1992 – $14
1991 – $13
1990 – $12

PC-NDX is a disk-based keyword index to *PC Magazine*. The 1993 edition includes over 14,000 keywords which index the entire contents of all 22 issues of *PC Magazine*. A powerful search program displays citations which include the article title, description and page number. The 1994 edition is available on a quarterly, semi-annual or annual basis. Shipping & handling is $3.00 per order.

PC ndx

PC-NDX
P.O. Box 1714
Mishawaka, IN 46546-1714
(219) 256-1045

CIRCLE 572 ON READER SERVICE CARD

Bar Coding for Windows

Code 39 Code 93 Int 2 of 5 PostNet
Code 128 Codabar MSI-Plessey UPC/EAN ISBN

Postscript/TrueType Fonts
Easy-to-Use
30 Day Guarantee
$149 each + S&H

Readers from $129

Call for FREE Information

210.590.9528

fax: 210.656.8993

10902 Forest Smt, San Antonio, TX 78233

riversedge™

CIRCLE 569 ON READER SERVICE CARD

SAVE ON

9 TRACK TAPE SYSTEM

FOR IBM PC/XT/AT
286/386/486

- Mainframe - PC Data Xfer to 24 MBytes/min
- Complete Software Packages, DOS, UNIX
- Ready to Operate Systems, Std. & SCSI
- Service and Support, Easy Installation
- No. 1 in Customer Satisfaction
- 3480, Cartridge, Tape Duplication Systems
- New/Unused, Reconditioned, Used MTUs
- Data Conversion/Duplication Services

call (919) 763-8400 or write to
4334 Market St., Wilmington, NC 28403

WILTEC

CIRCLE 570 ON READER SERVICE CARD

VIKING DATA ENTRY

Professional Quality Software
makes your difficult data entry jobs easier.

Viking Customer Care
insures you a quick easy conversion to VDE.

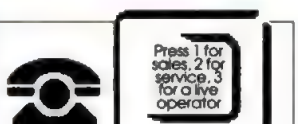
For PCs, UNIX and VMS.

Call for free preview
800-324-0595

Ph. 918/491-6144 • Fx: 918/494-2701
In UK. 0937 588056 • Fx: 0937-588059

VIKING

Viking Software Services, Inc.
4808 E. 67th Street, Suite 100
Tulsa, Oklahoma USA 74136-4959



Voicemail Cash Machine

Make thousands of dollars effortlessly by installing our voicemail in your 286/386. Use it to answer your home office phone, rent pocket-pagers, advertise products or operate a pay-per-call service using credit cards, passwords or a 900#. Systems start at $295.

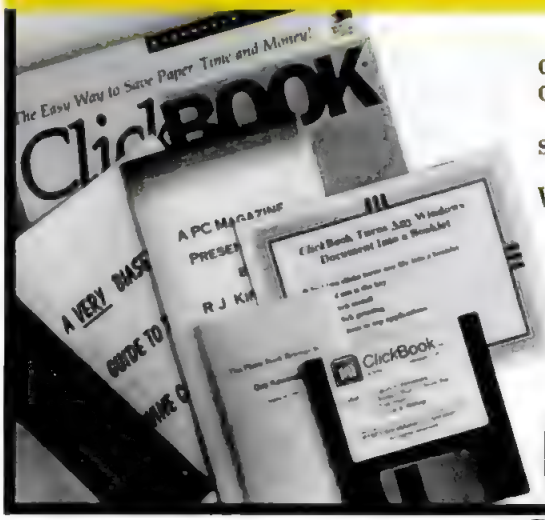
☎ Call 24 hours: 800.283.4759
Int'l & Demo line. 818.718.9560

DemoSource™
The Voice Application Superstore

8345 Reseda Bl, Ste 202
Northridge, CA 91324 USA

CIRCLE 573 ON READER SERVICE CARD

To turn ANY Windows document into a handy booklet, just click, staple, and go!



Turn a 24 page report into a 6 page booklet. Transform pages of addresses into a pocket sized directory. Print manuals, programs, cookbooks, and more. *Click*Book™ makes it a snap!

Just click and *Click*Book lets you select one of 18 styles, then it sets it all up, and even shows you how to print and staple.

*Click*Book saves time, money, and paper. And it makes your Windows documents a pleasure to read.

The experts are raving about *Click*Book.

" The most useful utility I've seen in months. It turns virtually any document created by a Windows application into a neat little booklet."
– Jim Seymour, PCWEEK, 8/9/93

" For saving paper and making virtually any kind of document easy to handle, *Click*Book is a great utility that's stunningly easy to use."
– PC Magazine 11/23/93

BookMaker

Make your documents look like a million for just $69.95

Call 1-800-766-8531 to order *Click*Book or (415) 617-1101 to find out more.

CIRCLE 574 ON READER SERVICE CARD

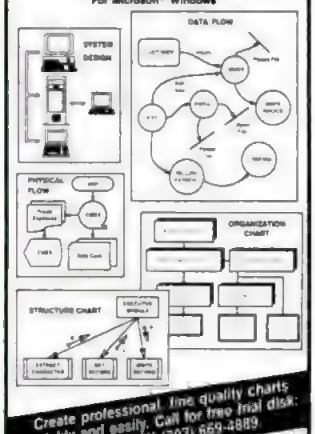
America's most popular, most complete, and most affordable solution for the mail order business—order entry/review, credit card processing with draft capture, UPS manifesting, profit analysis, accounting, telemarketing, list management. Clipper compiled, dBase III + files. Single and Multi-user versions. Find out why more people buy MOM after comparing!
Demo Kit $25 refundable deposit

MailOrderManager™

Dydacomp Development Corporation
150 River Road, Suite N1, Dept. PCM
Montville, NJ 07045
1-800-858-DMOM
201-335-1256

CIRCLE 575 ON READER SERVICE CARD

RFFlow
Professional Flowcharting
For Microsoft® Windows™



Create professional, fine quality charts quickly and easily. Call for free trial disk:
(303) 663-5767 FAX (303) 669-4889

$129.00

RFF ELECTRONICS
1053 Berner Court Loveland CO 80538

CIRCLE 577 ON READER SERVICE CARD

Foreign Languages for Your Computer

ÂÄÇËÏÓÖÙàâéõù
АБВГДЖЗИКлмыйю
דנהגחזלפשעטאב
ΩΠÇΣΦΛΨϕπόΣωδ
ᎯᎰᎴᎵᎾᎿᏂᏆᏊᏋᏒᏖ
ᏃᏈᎥᎧᎭᎲᎶᎺᎽᏁᏅᏉ

Compatible with most DOS & Windows applications....(MS Word, Wordperfect, Ami Pro, Excel, Pagemaker, Dbase, etc..)

International Desktop Software
6461 Orangethorpe Ste. 4
Buena Park, CA 90620
(714) 522-7870
Fax (714) 522-7074

CIRCLE 578 ON READER SERVICE CARD

IMAGES WITH *Impact!* FOR WINDOWS

Your presentations and documents will come alive with over 1,000 high-impact WMF graphics. Includes: business, cartoons, food, healthcare, nature, people, sports, presentation helpers, travel and more! Works with Windows and DOS. Available on disk and CD-ROM.

Special Offer $79.95
Suggested Retail $119.95

1-800-456-0234
ext. 42 Call for a free brochure and a retailer near you.

CIRCLE 579 ON READER SERVICE CARD

The Mail Order Wizard™

Everything you need to manage your growing phone-order or mail-order business.
- Order processing
- Mail list management
- Electronic charge processing
- Inventory control
- UPS manifest
- Financial reporting
- Ad forecasting

Winner of *Home Office Computing*'s General Excellence Award

Systems start at $695
Call for free info or $20 demo.

The Haven Corporation
1227 Dodge Ave., Suite M93
Evanston, IL 60202-1008
800-676-0098 or 708-869-3553

CIRCLE 576 ON READER SERVICE CARD

THE DATA ENTRY SOFTWARE SYSTEM FOR PCs

KeyEntryIII®

Announcing Version 6.0!!
- Completely revised and redesigned documentation
- Totally new user interface
- New pull down menus, windows, and dialog boxes
- Powerful editing capabilities
- Enhanced data formatting capability
- Upgradable to ImageKey™ for image-assisted data entry

Call 800-533-6879 for more information!

SCS Southern Computer Systems, Inc.
205-251-2983 FAX 205-322-4851
In U.K., SCS Europe Ltd.
0753-536550 FAX 0753-536765

B.S. & M.S. In Computer Science
- ALL COURSES HOME STUDY
- Approved for tuition reimbursement by leading corporations
- Increase your earning power
- Join students from leading computer companies
- Ada and C++ courses available

FOR FREE INFORMATION CALL 1-800-767-AICS or 1-205-323-6191

AMERICAN INSTITUTE COMPUTER SCIENCES
The leading edge of learning

Slide Imagers®

Overnight $4.95 Slides & Canons

Digital Output
- Slides/Overheads
- Dye-Sub Output
- Large Color Posters
- Canon Fiery Lasers
- Slide Duplication
- 4x5 Neg/Pos/B&W

Photo CD™ Scans $.90

(800) 232-5411
22-7th St. • Atlanta, GA 30308 • 404-873-5353

CIRCLE 580 ON READER SERVICE CARD

SERVICE BUREAU OUTPUT

35mm Color Slides
Color Overheads
Canon® Color Prints
Dye Sublimation Prints
4 x 5 Transparencies
Color Scanning
Video Output

NEXT DAY DELIVERY

IMAGE CENTER

703/343-8243 • Fax: 703/343-0691

800/433-8829

CIRCLE 581 ON READER SERVICE CARD

UP FRONT Multimedia, Inc.

Complete Kits
TEXEL TOSHIBA SONY
w/ PRO-AUDIO 16 & SPKRS
From $389.95
w/ 6 Top CD Titles
2 Year Warranty
VISA-M.C.-AMEX

CD-ROMS
100's of Titles
Best Prices!
Drives & Software
IBM MAC
(800)923-7667 Toll Free
(818)782-3683/FAX(818)782-4411
Call for Free Catalog

SPECIALS
GROLIER'S V.1.5 MPC ENCY. $50
'92 COLLEGE HANDBOOK $9.95

CIRCLE 584 ON READER SERVICE CARD

HOME improvements

At these value prices, you can afford to get organized!

DOS version was $34.95 NOW $24.95

WIN 3.1 version was $59.95 NOW $39.95

Scarborough Enterprises, Inc.
2600 1st Ave. N.
Anoka, MN 55303
FAX (612) 427-9717
Phones Open 7AM – 7PM CST

VISA

Organize!

The Ideal Home Organizer!

- Address Book
- Word Processor
- The Record Keeper
- Daily Planner
- Personal Journal
- Family Scrap Book
- Recipe Book

Keep It All Organized on Your PC
–at home, at the office, on the road!

CALL AND ORDER TODAY!
612•427•9100
Phones Open 7AM – 7PM
Dealer/Retailer Volume Discounts Available

CD-ROMs Free Catalog
Best Prices on CD's

7th GUEST (2 CDs)	$38
CICA MS WINDOWS	$18
CLIPART HEAVEN	$22
COOKBOOK HEAVEN	$19
GGA GAMES	$17
KODAK PHOTO CD	$18
LEARNING HEAVEN	$19
MARO SIMSONG	$24
MAYO CLINIC	$24
MIXED UP MOTHER GOOSE	$18
MONKEY ISLAND	$22
PUBLISHIT V2.0	$17
QRZ HAM RADIO	$19
REFERENCE LIBRARY	$19
SHAREWARE HEAVEN 2	$29
SIMTEL ARCHIVES	$18
SOLAR HEAVEN	$19
SOUND WAVE	$22
WINDOWS HEAVEN	$24

Write or Call:
MOST SIGNIFICANT BITS
15508 Madison Avenue
Lakewood, Ohio 44107
(800) 755-4619

CIRCLE 582 ON READER SERVICE CARD

FREE
CD SOFTWARE BUYER'S GUIDE

Hundreds of titles reviewed. Free, up to the minute information available online: up to 9600 baud (415) 543-3343. CD-ROM version includes sample screens, only $4.95. To order your free CD Software Buyer's Guide, call:

800-223-9779
or order by fax: (415) 543-3532

CIRCLE 585 ON READER SERVICE CARD

Key-Lok™ Security

- ☐ Fighting piracy since 1982.
- ☐ Algorithmic response
- ☐ Programmable memory
- ☐ Very economical
- ☐ Device transparent to PARALLEL /SERIAL port
- ☐ Multiple security layers
- ☐ Counters/Real-time clock
- ☐ Multiproduct licensing
- ☐ DOS/UNIX/VMS/etc

Access Control System

Diskette Drive Locks

Microcomputer Applications
3167 E. Otero Circle
Littleton, CO 80122
(303) 770-1917

CIRCLE 586 ON READER SERVICE CARD

Interested in PC SECURITY..
CALL
(813) - 744-5177
FAX
(813) - 744-5197

EliaShim
MIRCOCOMPUTER INC.
4005 WEDGEMERE DRIVE
TAMPA, FLORIDA 33610

CIRCLE 587 ON READER SERVICE CARD

CD-ROM DRIVES

TOSHIBA, TEXEL & NEC

SCSI INTERFACE
TRANTOR
MEDIA VISION

CD-ROM TITLES, MAC & DOS
CD-ROM CADDIES & ACCESSORIES

COMPUTERS AT LARGE
Dedicated to CD-ROM Technology
Please Call for Our Price List

PH:(408) 255-1081 FAX:(408) 255-2388
800-642-4194
SARATOGA, CA

CIRCLE 583 ON READER SERVICE CARD

CD-ROM PRICE CLUB

PANASONIC
562 DUAL SPEED CD-ROM DRIVE
300KBS-325MLS
WITH INTERFACE CARD $219

STREET ATLAS VER 2.0 FOR WINDOWS $84
AMERICAN BUSINESS PHONEBOOK
11 MILLION PHONE NUMBERS $19
9 DIGIT ZIP CODE DIRECTORY $19
CD CAD 3.7 1000S OF DFX SYMBOLS $19
1001 UTILITIES $10 BUSINESS ASSISTANT $10

THE PICK SHAREWARE VOL.1 $20
640MBS OF THE LATEST DATE CHECKED FILES

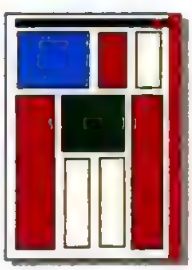
DESKTOP PUBLISHERS DREAM DISK
OVER 2000 FONTS & 3700 PIECES OF CLIP ART $29
+++ 184 PAGE BOOK+++

100s OF TITLES IN STOCK MANY FOR
CALL OR FAX FOR OUR LISTINGS UNDER $10
TEL 516-563-0617 VISA DISCOVER MASTERCARD
FAX 516-563-0618

JD EXPRESS Inc.
For Your CD-Roms
335 KNICKERBOCKER AVE. BOHEMIA, NY 11716

THE NEW PC MAGAZINE CLASSIFIED FORMAT GIVES YOU MUCH MORE FOR FAR LESS...

- New Flexible Ad Sizes
- More Color Options
- Lower Cost-per-Inch Rates



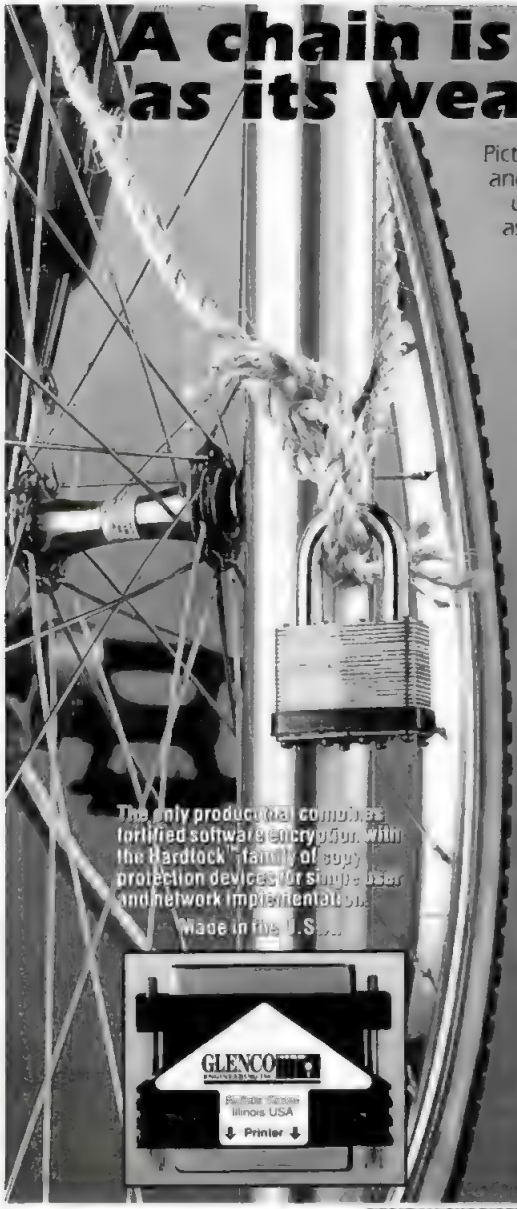
Call your PC Magazine Marketplace account representative today at:
1-800-825-4237
and let the new Classified work for you.

A chain is as strong as its weakest link.

Picture your Hardlock™ key as a bike lock, and the accompanying software routines used to implement the copy protection as the chain. You can own the best lock that money can buy, but that lock is useless if the chain is weak.

Introducing **HL-Crypt**, a major breakthrough in copy protection. HL-Crypt is not just a shell or simple conditional response checker. Using our proprietary Patcher Technology, HL-Crypt encrypts and binds the application to your Hardlock™ device. HL-Crypt features many protection modules that secure the application against piracy, reverse engineering, and debugging, to name a few.

Picture HL-Crypt as an ironclad chain. The only ironclad chain in the industry today.
For more information, call
1-800-562-2543



HL-Crypt

The Fortified Protection Linker for Hardlock

GLENCO ENGINEERING INC.
SERVING THE SOFTWARE INDUSTRY SINCE 1979
270 Lexington Drive
Buffalo Grove, IL 60089-6930
Phone 708/808-0300
Fax 708/808-0313
Contact us for the name of the distributor in your country.

CIRCLE 588 ON READER SERVICE CARD

PROTECT YOUR SOFTWARE TODAY

EVERLOCK 3.0

Software Solution

- ☑ OPTION BOARD SAFE
- ☑ CPU LOCK
- ☑ REMOTE REGISTRATION
- ☑ CD ROM LOCK
- ☑ MSDOS 6.0 & WINDOWS COMPATIBLE

with over 14 new features you have asked for over the years. If Software based protection is what you need, don't settle for anything less than **EVERLOCK 3.0.**

EVERKEY LOCKS & BUTTONS

Hardware Solution

We have combined the Versatility of Az-Tech Software and the **ONE WIRE** Hardware Compatibility of Dallas Semiconductor in the new **BUTTON** package. With It's PRICE advantage and added Flexibility, EVERKEY BUTTONS will lead us into a **dongleless** world.

As your partner in the fight against Software Pirates, Az-Tech is the only company that offers you these options in both a Software and a Hardware Solution:

****DATE & EXECUTION LIMITS* COMPRESSION *ENCRYPTION * SERIALIZATION* REMOTE RESET***

These systems are easy to use and most importantly, they work! No other company can provide you the Compatibility, Flexibility, Ease of Use and Degree of Protection that you receive with all Az-Tech products.

Az-Tech Software, Inc.
LEADERS IN SOFTWARE SECURITY
201 East Franklin, Suite 11 Richmond, MO 64085
(816) 776-2700 FAX (816) 776-8398

Call Today For A Free Demo Disk
(800) 227-0644

CIRCLE 589 ON READER SERVICE CARD

Dongles? Buttons? Plugs?

Get Serious.

When it comes to software protection, you need solutions – not gadgets. You need **HASP** – *the Professional Software Protection System.*

Easy to Implement
Interfaces are available for most languages and a variety of installation options are supplied to meet your needs and schedule.

Technology That's Tough to Beat
ASIC technology, sophisticated software and random encryption algorithms are just a few reasons your products are safer protected by HASP.

Developed with Users in Mind
Transparency. Compatibility. Connectivity. HASP was developed to perform unnoticed. Whether installed on a PC, Mac or network, your end-users will never know it's there.

Get Serious – Try It For Yourself
Find out why HASP is the fastest growing form of software protection in the industry. Order your HASP evaluation package today.

1-800-223-4277

ALADDIN
SOFTWARE SECURITY INC
The Professional's Choice

The Empire State Building
350 Fifth Avenue, Suite 7204
New York, NY 10118, USA
Tel: 212-564-5678
Fax: 212-564-3377
Offices & Distributors Worldwide
©1994 Aladdin Software Security Inc

CIRCLE 632 ON READER SERVICE CARD

ICA Software

DARE TO COMPARE

Highest Quality
Lowest Price
SHAREWARE
Guaranteed!!!

Free Catalog
800-331-3065
P.O. BOX 1011-354 Trumbull, CT 06611

CIRCLE 590 ON READER SERVICE CARD

Unleash the power of your modem

The Exchange®
Bulletin Board System

Thousands of Free Programs
- Windows
- DOS
- OS2
- Word Processing
- Database
- Games
- Gifs
- E-Mail
- Live Chat & More
- Local Access from over 600 Cities
- All 14.4 kbs High Speed Modems

Great for beginners & advanced users of all ages

We're only a phone call away!
Modem: 515/270-2220

CIRCLE 592 ON READER SERVICE CARD

SOFTWARE DUPLICATION

- Highest Quality Media
- Competitive Pricing
- 24 Hour Turnaround
- Total Quality Assurance
- Custom Labels & Packaging
- Sales and Service of: DUPLICATION EQUIPMENT

PRINCETON DISKETTE
800 426-0247
1101 EXCHANGE PL., PENNINGTON, NJ 08741

CIRCLE 594 ON READER SERVICE CARD

PCMCIA Card Duplicator

- Duplicates PCMCIA 2.0/JEIDA4.1 (Type I, II, III) cards in all technologies (FLASH, SRAM, OTP EEPROM, Mixed)
- Ultrafast! Copies 32x1Mb Flash cards in 13 seconds
- Software is Windows based with optional Touch Screen interface

B&C MICROSYSTEMS INC.
Tel: (408) 730-5511 Fax: (408) 730-5521

CIRCLE 624 ON READER SERVICE CARD

REMOVE HARDWARE LOCKS

Maintain Productivity!

Software utility that allows for the removal of hardware locks
Easy-Simple-Guaranteed

These and others are available:

MaxRoute	$250.00
Pads PCB	$99.00
CadKey	$99.00
MasterCam	$250.00
Tango PCB II	$99.00
MicroStation	$99.00
PCAD	$250.00

Visa and Mastercard Welcome
Call or Fax for more information

SAFESOFT SYSTEMS INC.
201-1111 MUNROE AVE.
WINNIPEG, MB
CANADA R2K 3Z5

PH (204) 669-4639
FAX (204) 668-3566

CIRCLE 591 ON READER SERVICE CARD

DATA CONVERSION

If you want the most complete conversion services in the industry, just call...

(800) CONVERT

Capabilities include over 5000 formats

PIVAR COMPUTING SERVICES, Inc.®
165 Arlington Heights Rd. #M
Buffalo Grove, IL 60089
(708) 459-6010

SOFTWARE DUPLICATION

Complete Software Manufacturing Solutions
- Duplication 100% Guaranteed
- Highest Quality Media & Equipment
- Ultra Competitive Pricing
- 24 Hour Turnaround
- Graphic Design & Manual Printing
- Packaging, Assembling & Shrinkwrapping
- Excellent Service

APC, Inc.
29620 Union City Blvd
Union City, CA 94587
Local 510-489-8677
Fax 510-489-8678

800-666-1007

CIRCLE 595 ON READER SERVICE CARD

WE WROTE THE BOOK ON DISK DUPLICATION.

Call Us For Your Free Copy !

- *Diskette Duplication*
- *Packaging / Fullfillment*
- *Magnetic Media Testing*
- *Professional Mastering*
- *Statisical Process Controls*
- *Fast Turn Around*
- *Great Prices / Flexible Terms*

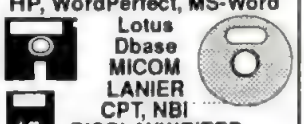
MATRICS CORP.
1-800-747-0583
Rochester, New York

CIRCLE 597 ON READER SERVICE CARD

DATA CONVERSION

DISKS • TAPES • CARTRIDGES
CONVERSION-DUPLICATION-SCANNING
MORE FORMATS THAN ANYONE !

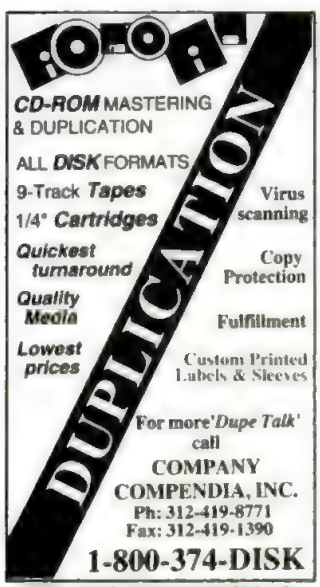
Quick • Reliable • Quality
WORD PROCESSORS, MINIS
MICROS, SPREADSHEETS
DATABASES, MAIL LISTS
IBM, DEC, APPLE, WANG
HP, WordPerfect, MS-Word



Lotus
Dbase
MICOM
LANIER
CPT, NBI
DISPLAYWRITER
8/4MM, XEROX, CP/M, UNIX ...

NATIONAL DATA CONVERSION
5 East 16th Street, New York, NY 10003
(212) 463-7511
AMERICA'S LEADERS IN DATA CONVERSION

CIRCLE 593 ON READER SERVICE CARD



CIRCLE 596 ON READER SERVICE CARD

DUPLICATE ANY FORMAT
- 5¼" and 3½" Diskettes
- Fast and Versatile
- Easy to Use
- Stand-Alone or PC Based

Victory Enterprises
223 West Anderson Ln.
Suite B-300
Austin, Tx. 78752
(512) 450-0801
Fax (512) 450-0869

VICTORY ENTERPRISES Technology Inc

800-727-DISK
(3475)

CIRCLE 598 ON READER SERVICE CARD

DUPLICATION EQUIPMENT

- StandAlone & PC based units available
- Compact design
- Low maintenance
- Economically priced
- Expandable options to network system
- Fast – Up to 138 3- 1/2' 1.44MB per hour
- One year factory warranty

BULK DISKETTES DATA CARTRIDGES MEDIA SUPPLIES

CALL: CHAMPION DUPLICATORS INC.

800-752-2135 FAX 319-659-0217

CIRCLE 599 ON READER SERVICE CARD

HARD CASE PROTECTION

Your notebook won't feel a thing!

NB-4000 $179.95

Holds computer accessories, files and disks (pictured)

NB-3000 $149.95

Holds computer & accessories

NB-1000 $59.95 $69.95

- Hard shell reinforced construction
- Lockable • Made in USA

1-800-475-0707
719-531-5535

DOUBLECASE
5350 N. Academy Blvd
Colorado Springs, CO 80918

CIRCLE 602 ON READER SERVICE CARD

GLOBAL

11 Harbor Park Dr. Dept PCM1
Port Washington, NY 11050

FREE GLOBAL CATALOG

212 page guide to computer furniture, supplies and accessories

DIAL Toll-Free
1-800-8-GLOBAL

CIRCLE 605 ON READER SERVICE CARD

SOFTWARE DUPLICATION

Disks and Tapes
Printing Services
Package Assembly
Fulfillment
In-Bound Tele-Sales

Introducing
CD-Rom Duplication

DUPLICATION EQUIPMENT

Autoloaders
Standalones
Labelers
Sleevers

MEGAsoft

(800) 222-0490

FAX: (908) 462-5658
819 Hwy. 33E. • Freehold, NJ 07728

CIRCLE 600 ON READER SERVICE CARD

DUPLICATION FROM $.49

HIGHEST QUALITY MEDIA

From $.49 (5.25") and $.80 (3.50")

- All Diskette Formats
- Custom Labels
- Diskette Mailers / Accessories
- Assembly Services
- Generous Volume Discounts

FORMATTED DISKETTES

FORMATTED	QTY 250	BLANK
$.69	3.50" DS/HD	$.59
$.56	3.50" DS/DD	$.49

- **FREE FORMATTING** on First Order
- **BASF, MEMOREX, VERBATIM**
- **SONY AVAILABLE** for Small Upcharge
- **COLORED MEDIA** Please Add $.05

800-255-3142

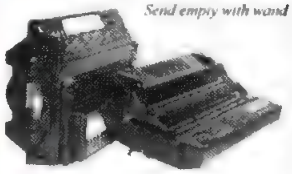
Diversified Systems Group, Inc.
PO Box 1114, Issaquah WA 98027

CIRCLE 601 ON READER SERVICE CARD

TONER CARTRIDGES REMANUFACTURED

PRICES FROM $45 SHIP INCL.

Send empty with wand



TESTED - GUARANTEED - 24-HR TURN

HP, Apple, Canon, IBM, etc. Laser Cartridges
Canon/Sharp-Z/Xerox Drum Copier Cartridges

MICR Toner, Fonts, Software for Laser Check Printing
Color Toners for Canon and IBM engines
OPC Cartridges and Toner for almost all laser printers

1-800-239-4027
1-800-722-2804 (Atlanta)

ADVANTAGE LASER PRODUCTS, INC.

1929 Queen City Ave Tuscaloosa, AL 35401
2030 Powers Ferry Rd STE 218 Atlanta, GA 30339

CIRCLE 603 ON READER SERVICE CARD

media source

SINCE 1986

DISKETTES

100% Guaranteed

PC Grade

Blank	Formatted	Blank	Formatted
3.5 DS/DD 32¢	36¢	3.5 DS/DD 40¢	43¢
3.5 HD 46¢	52¢	3.5 HD 59¢	67¢
5.25 DS/DD 18¢	23¢	5.25 DS/DD 22¢	26¢
5.25 HD 24¢	29¢	5.25 HD 28¢	36¢

High Grade O.E.M. Duplicator Bulk

SONY/Verbatim Bulk

Blank	Formatted	Blank	Formatted
3.5 DS/DD 54¢	57¢	5.25 DS/DD 22¢	26¢
3.5 HD 90¢	96¢	5.25 HD 30¢	37¢

All 5.25 Include Sleeves, Prices per lots of 100
Lower on Higher Quantity

800•356•2553
FAX (404) 919•9228

CIRCLE 604 ON READER SERVICE CARD

Ontrack DATA RECOVERY

- PROFESSIONAL SERVICE - AUTHORIZED by Conner, Iomega, Maxtor, Micropolis, Quantum, Rodime, Seagate, Western Digital, & others.
- EXPERTISE in DOS, Novell, OS/2, Macintosh, Unix, Xenix, Banyan Vines, Sun, DEC, & Wang. Service also available on tape & removable media.
- ON-SITE, weekend, & priority service backed by 24-hour worldwide support.
- FOR FAST, SUCCESSFUL RESULTS call Ontrack, we can recover your data!

MN: 1-800-872-2599 • CA: 1-800-752-7557
U.K: 44-81-974 5522 • Germany: 0130-815-198
6321 Bury Drive, Eden Prairie, MN 55346 • 2400 Main Street, Suite 200, Irvine, CA 92714

FORMATTED DISKETTES

5¼"360K ... 39¢ 3½"720K ... 45¢
1.2mg ..... 46¢ 1.4mg ..... 58¢

TAPES

2000 ..... $11.00 2120 .... $15.50
6150 ..... 15.50 6525 ..... 22.50
4mm ..... 11.25 8mm 10.25

SONY • BASF VERBATIM

Price per disk in lots of 300
Subtract .04¢ for unformatted DD.
Subtract .09¢ for unformatted HD.
Tapes in lots of 10. Mix and Match.

MEGAsoft

(800) 222-0490

FAX: (908) 462-5658
819 Hwy. 33E. Freehold, NJ 07728

CIRCLE 604 ON READER SERVICE CARD

HARDWARE YOU WEAR!

The IntelliGents belt adds real style to jeans and pinstripes!

- *Gold, floppy disk buckle, crafted in Italy and perfect in every detail*
- *Reversible, black and cordovan belt*
- *Soft, supple leather*
- *Custom fits all sizes up to 44"*
- *Elegantly gift-boxed*

Only $35 +$3 S&H
Check, PO, MC, VISA, AmEx
Field Technologies Inc.
33 Danbury Rd, Wilton CT 06897
(203) 761-9363 FAX (203) 761-9358
Satisfaction Guaranteed

CIRCLE 606 ON READER SERVICE CARD

BULK DISKS

SONY◆DYSAN◆VERBATIM

		QTY 250 BLANK	QTY 250 FORMATTED
5¼"	DS/DD	.33	.39
5¼"	DS/HD	.37	.45
3½"	DS/DD	.39	.47
3½"	DS/HD	.49	.59

5¼" INCLUDE SLEEVES/24 HOUR SHIPPING

800-426-0247

We also sell and service duplication equipment and disk duplication services.

PRINCETON DISKETTE

1101 Richmond Ave., Pt. Pleasant Bch., NJ 08742

CIRCLE 607 ON READER SERVICE CARD

THE NEW PC MAGAZINE CLASSIFIED FORMAT GIVES YOU MUCH MORE FOR FAR LESS...

- New Flexible Ad Sizes
- More Color Options
- Lower Cost-per-Inch Rates

Call your PC Magazine Marketplace account representative today at:

1-800-825-4237

and let the new Classified work for you.

NEARLY 9 OUT OF 10 PC MAGAZINE SUBSCRIBERS HAVE PURCHASED DIRECT IN THE PAST YEAR, AVERAGING ONE DIRECT PURCHASE EVERY MONTH.

For more information on how you can advertise to these direct buyers, call your PC Magazine Marketplace account representative today at:

1-800-825-4237

PC MAGAZINE **CLASSIFIED**

Source: PC Magazine Direct Market Subscriber Study, 1992

Test Drive Our CD-ROM BBS
(305) 428-0012
- Adult Rated GIFs, JPEGs, & Movies
- Chat with Hostess Sin-D
- Multiplayer Games
- On-line GIF Viewing
- Throbnet, Fidonet, & Internet

CD-ROM BIG BANG THEORY

TRY A STARWARE 4-WAY

We've done all the dirty work and gleaned the Best of the Best adult titles. So take a look at our 3-Somes & 4-Ways below and let us help you build your personal library.

THE AL BUNDY

If you are an everyday kind of guy just like our hero, Al Bundy, and you really love'em big, then this is the Bundle for you. Our 3-Some includes H••ter Heaven, The Adventures of Seymore Butts & Paradise Club Interactive for Windows or Digital Dancing for Mac Users. To make it a 4-Way, just add Nightwatch Interactive.

FREE

MultiMedia Gift with every purchase of a Starware 3-Some or 4-Way.

1-800-[illegible]

ORDER FAX LINE
(305) 426-980[illegible]

STARWARE PUBLISHING CORPORATION

Department 263
P.O. Box 4188
Deerfield Beach, FL 33442

MUST BE 21 YEARS OLD

NOT FOR CABLE TV 2

This is the Multimedia version of our best selling GIF Bundle. Just wait until you get hold of our most explicit CD's. 3-Some bundle has Cat & Mouse - The Movie, New Wave H••kers and Nightwatch Interactive. Watch Traci Lords entertain in Traci I Love You, to make an excellent 4-Way.

NOT READY FOR HOLLYWOOD

Adult movie's BIGGEST names: Teri Weigel, Traci Lords, Zara Whites, Jeanna Fine & more... These lovely ladies will sizzle your screen & blow your sound card. This classic 3-Some includes Wicked - The Movie, Traci I Love You, and The Mark of Zara Photo CD. 4-Way action? Add Legends of P•rn 2.

FOR COUPLES ONLY

Have you ever heard of Adult movies with a plot? We've come as close as possible by putting together the best movies for both of you. The 3-Some includes Cat & Mouse - The Movie, Betrayal and Sleeping Beauties. Swing into a 4-Way by adding Double Play II.

HOT MAGAZINE HONEYS

You've hungered for these honeys through countless magazines and now you can have them permanently on CD-ROM! Our 3-Some includes the most talked about New CD titles – Penthouse Interactive (so hot it counts as two) and Wicked Photo CD (starring former Playboy Playmate Teri Weigel). To make it an Extra Large 4-Way, add H••ter Heaven.

Starware Publishing has always been a pioneer in the Adult CD-ROM revolution. In fact, we've been in the business longer than anyone in the industry. So you can have complete confidence in the fact that we offer only the highest quality and latest in Adult CD-ROM technology.

SUPER VGA #2

This will make you forget about GIF disks forever. SUPER HIGH RES IMAGES!!! 24-BIT COLOR!!! All in Kodak's Photo CD format. Two disks even come with complete unlimited usage rights. In our 3-Some, you get The Mark of Zara Photo CD, Cat & Mouse Photo CD and Double Play I. 4-Way special bonus – add Wicked Photo CD with free Kodak Access software.

Ask about our new CD-ROM CLUB
- Free CD's • Contests
- Discounts • Club BBS and more!!!

ALL 3-SOMES ONLY $168
4-WAY ACTION ONLY $208

VISA

SHIPPING INFORMATION
[illegible] and Mail Orders receive free 2nd day shipping upgr[illegible]
Ground - $4.60 • 2nd Day - $7.25 • Next Day - $1[illegible]
Foreign Express - 22.00 • 4-Ways slightly more

FREE TECH SUPPORT

CIRCLE 608 ON READER SERVICE CARD

WORLD CLASS BBS-ADULT GRAPHICS ON-LINE

A revolution in on-line entertainment where the on-line world meets

Provocative, Sexy, Adult, Tantalizing, Sizzling

BBS NUMBERS
64 lines 14.4k v32bis 8/n/1
- 800-466-6336 — USA
- 503-697-5100 — Anywhere
- COMPUSERVE — World-wide

Call us direct via Compuserve
Membership not required
USA Mainland host name (EVENT)
INTERNATIONAL host name (EVENTI)

On-Line for 10 years
Most successful BBS
As featured on TV:
"A Current Affair",
"Computer Chronicles"
"CBS NEWS","CNN" and read in
TIME Magazine, Boardwatch,
New Age Media
Cybersex, Newsweek
to name a few

ENDLESS ON-LINE ENTERTAINMENT
SuperVGA 1024x768x256
Movies at 30/fps SVGA!
Video for Windows/AVI/GRASP/FLI/FLC
COLOR MOVIES SUPPORTING
VGA/SVGA/FLI/FLC/SOUNDBLASTER
MOUSE/RAM/EMS
RIP Graphics – The best games on-line
The Center of Infinity
The Black Hole Playground
Journey Through the Universe
Escape from Languor
Easy User Interface
Home of "MaxiPic"

CHAT SYSTEM - LIVE ADULT NATIONAL LINK - MASSIVE COLLECTION ORIGINAL IMAGES AND SOFTWARE. 30,000 USERS.
ASTRONOMY • HUGE ADULT AREA • SCENIC • GRASP • ANIMATOR 3D • GAMES UTILITIES • IMAGE CONVERTERS

EVENT HORIZONS BBS Must be 21 to access! 24 hrs. No access? Order now! Now using a Credit Card! Worldwide shipment. Info voice line (503) 697-7799. Credit cards accepted. Same day shipment. EVENT HORIZONS, INC., 111 Avenue B, Ste. 286, Lake Oswego, Oregon 97034 • Voice (800) 530-7700 or (503) 697-7700 for info.

CIRCLE 609 ON READER SERVICE CARD

FOR ADULTS ONLY
You must be over 21 to access

LIFESTYLE
Meet sexy singles/couples on the world's hottest adult chat system—Lifestyle BBS.
Less than .30 per hour.
Log on: 516-689-5390

AND

GRAFIX
Computer pictures so hot they could melt your modem.
Log on: 516-689-2853

SUPER CHEAP • 100% PRIVATE
Local access from 500+ cities

CIRCLE 610 ON READER SERVICE CARD

FREE
BodyCello
Adults Only CD Sampler
Sample 20 demos of the finest in adult entertainment software.
Check out new interactive titles like Desktop Voyeur, The Fox Pack and Desktop Mistress.
Beautiful nudes and artwork from world-renowned artists.
MAC & MPC CD-ROM #555
*Just send $4.75 for postage/handling in U.S.
(Outside the U.S. & Canada send $15)
1-800-922-3556
Must be 21 to order. Dealer Inquiries Welcome
CALL FOR A FREE COLOR CATALOG!
BodyCello • P.O. Box 910531 • Sorrento Valley, CA 92191
619-578-6969 • FAX 619-536-2397 BM2

CIRCLE 612 ON READER SERVICE CARD

THe 'INFAMOUS' GaRBaGe DuMP

505-294-5675
via Modem
FREE Trial Accounts Available

CIRCLE 613 ON READER SERVICE CARD

SEXY MODEM
Call from home or office!
•The Ultimate BBS•
FREE
- Sexy Chat with Singles/Couples
- 100,000 Shareware & Adult GIF, Windows and DOS files
- USA Today Online
- FREE ACCESS
- Unlimited Downloads
- 14.4k on all 60 Lines
- New GIF's posted daily by our photographers

1-217-792-3663
Must be over 21 to access
Customer Support Voice Line 415-281-4429

CIRCLE 611 ON READER SERVICE CARD

The Most Coveted
OUI
MAGAVINE

Be the most envied and sought-after reader of OUI Magazine. Just look through your PC... all in glorious CD color!

CD 101: The Girls of OUI	$69.95
CD 102: OUI Blondes	$69.95
CD 103: OUI Girls With Girls	$69.95

VISA ORDER HOTLINE 1-800-201-2979 MasterCard
Must be 21 years or older to order. Shipping and handling extra.

"Hey, I've seen this GIF before..."

by this time you must be tired of the same gifs. seems every bbs out there has the same collection. the fact is, they're old and rusty. luckily, we've found a cure for your gif boredom: gourmet gallery bbs. we've got lots of gifs too, but they're all 100% original and never-seen-before. sure, eventually our gifs will show up on the other bbs's. but we'll just make more. and more. and more.

TIRED OF GIF DEJA VU? TRY US.

408.956.5656

Gourmet Gallery BBS — 12 LINES — NEW GIFS DAILY — 2400 - 14.4K BPS 8, N, 1

CIRCLE 614 ON READER SERVICE CARD

Sexy Software™ SEXY DISKS™

Sexcapades™ . . . The GAME

The First Adult Game with TRUE SOUND and 256 Color VGA Graphics

The game everyone has been waiting for. For that evening you won't forget with a loved one or group of very close friends. Fulfill your sexual desires. Find out how your partner would really like to make love. Over 80 Color VGA Scenes • Real Voices. Guide the Action • Play with 2-8 Close Friends. Now supports SoundBlaster™ cards!

$79 – Special Offer: $69 with purchase of any CC disk. / VGA and hard disk required - shipped on high density disks

CONNOISSEUR COLLECTION ALL NEW! In 256 Color VGA!!

ALL movies have sound - play thru standard speaker or SoundBlaster™

Sexy Disk #CC1 • ★ YOU BE THE STAR ★ The FIRST CUSTOMIZABLE movie. You write the dialog and title.

Sexy Disk #CC2 • THE FIRST SOUND MOVIE! The first computer movie with SOUND. See the incredible 256 color VGA graphics while hearing the actual dialog. OURS EXCLUSIVELY!

Sexy Disk #CC3 • THE BEST MOVIE! The best computer movie available. Only for the serious collector. 256 stunning VGA colors.

Sexy Disk #CC4 • VOLUPTUOUS MOVIE with Sound! See and hear a symphony of exceptionally proportioned women.

Sexy Disk #CC5 • ODDITIES MOVIE with Sound! See men of incredible proportions and women with unique abilities - UNBELIEVABLE!

Prices: 1 Movie $29, 3 Movies $65, 5 Movies $94

NEW!! Exclusively imported from Europe!! 256 Color VGA Games

SG4 P...TRIS - Adult version of the popular game. You reveal a hidden movie while controlling blocks falling down your screen. Multiple levels. MUST SEE!

SG5 P...PIPE - Adult version of Pipe for Windows (Windows not required) - Multiple movies revealed as the game progresses. HOURS OF FUN!

SG6 MOZAIK - Adult jigsaw puzzles with over 45 celebrity pictures - you reassemble the most exciting women on earth

Price: $35 each or all 3 for $89

ORIGINAL Sexy DISKS – 6 disk set with movies, pictures, games $32

ADD $4 S/H • 3.5" Or FOREIGN ORDERS ADD $2/DISK • IN PA ADD TAX • MUST STATE AGE OVER 21 YEARS

VISA/MC Orders Only: 800-243-1515 Ext. 600CI / 24 HRS / 7 DAYS

FAX (215) 997-2571 • Or CK/MO to: Sexy Software, P.O. Box 220, Dept. 600CI, Hatfield, PA 19440

Sexy Software™ SEXY CD-ROMS™

FREE $99 Shareware CD-ROM

with purchase of any 3 CD ROMS. Not a cheap demo disk - contains thousands of valuable programs in all categories - games, windows, business, education

Sexy FLIX – Full Length Digital Movies - Ours Exclusively!

KING D ** G** - The dirtiest dinosaur movie ever made - CRYSTAL HOLLAND stars

TOO NAUGHTY TO SAY NO - HARRY REEMS and GINGER LYNN star in an erotic daydream on a boarding school for girls - from CABALLERO HOME VIDEO

SEX GAMES - When a hacker taps into a computer dating service he is able to program the wildest fantasies of its sexiest member - SAUNA GRANT stars

Sexcapades - **The MOVIE** – See incredible uses of a mouse and a joystick as a group of friends play our popular Sexcapades game

NO HARD DISK SPACE REQUIRED - WINDOWS NOT REQUIRED

Sexy CD-ROMS

Sexy CD #1 the premiere adult collection - 680 MB of action with 5268 VGA pictures, 87 movies, 674 stories, games. DARE TO COMPARE!

Sexy CD #2 an exclusive collection containing over 900 Super VGA pictures (1024 x 768 x 256) and over 400 VGA pictures (640 x 480 x 256). These are pictures that cannot be found anywhere else! The women and the quality are stunning.

Sexy CD #3 another collection of over 650 MB of the hottest pictures available. Over 5,000 VGA pictures, movies and utilities that will have you spending days just trying to see it all!

MENU DRIVEN VIEWING - NO DUPLICATION

MIX & MATCH CD-ROMS / Sexy PIX™

B BABES • ECSTACY • ASIAN LADIES • HOT PIX 2, 3 & 4 • PC PIX 1, 2 & 3
TROPICAL GIRLS • STORM 3 • EROTIC GIRLS • 7TH HEAVEN
EROTIC ENCOUNTERS • ADULT PALETTE • MY PRIVATE COLLECTION 1 & 2
ANIMATION FANTASIES 1 & 2

ALL CD-ROMS: First 3 $99 each or 3 for $199 (PLUS FREE SHAREWARE CD-ROM!) Then $69 each or 3 for $149

CIRCLE 615 ON READER SERVICE CARD

HEAT IN THE NITE!

America's only FREE, no membership fee ADULT BBS, 1000+ calls daily, 10,000+ users. 60:40 male-female ratio. 14.4K modem, 32 lines! ACTION 24 hrs a day guaranteed. The cache where EROTIC singles and couples MEET!

NEVER A CHARGE! HOT!

One of the nations top 100 BBS's as rated by Boardwatch Magazine!

1-515-945-6227

Must be 21 to access

CIRCLE 620 ON READER SERVICE CARD

FREE GIFS

Download the "SEXIEST" & most "STIMULATING" Images from our ADULT On-Line Magazine - FREE !

LACE is an On-Line Magazine that **offers you:**

- ABSOLUTELY the **best Color Photographs and** Color Scans in the world **& not available on any other BBS!**
- GORGEOUS **Sexy Models both Amateur & Professional !**
- **VIDEO for Windows Files, the latest & hottest** Microsoft **Product. Play these Videos on your computer** and watch **our models come to life for you. One on One.** (.AVI)
- **LOCAL ACCESS #'s for over 800 cities in the U.S.**
- **ALL NEW FILES in our FREE files AREA !**
- **HIGH SPEED access available. (14.4k down to 1200 baud)**
- **AND . . . RATED #1 BY OUR USERS !!**

Set your Modem to 8-N-1 and your terminal emulation to ANSI

(818) 709-4275

Questions? Call our voice line at (818) 709-3705

LACE

the on-line adult magazine

May Only Be Accessed by Adults • Limited Offer

CIRCLE 616 ON READER SERVICE CARD

INTERACTIVE • ADULT CD-ROM

REG Publishing is proud to introduce its new line of Adult CD-ROM titles featuring Gorgeous and Stunning Centerfold Models. Each CD-Rom title allows you to experience interactive pleasure from 20 different photo shoots. Over 240 images in all! You decide from a visual table of contents which Model you want to become intimate with in either 8 or 24 bit Color. Plus we've chosen 40 of these images for 1024 x 768 display, too!

QUALITY • BETTER THAN PHOTO CD

Images so lifelike, that you feel as if they're "3" Dimensional...where you could just reach out & touch them. So why don't you?

"COD Volume #1": *April • Barbie • Brenda & 17 other Gorgeous Models* invite you to come watch them in their very own intimate nude photo shoots! Only $69.95 + $3.00 p/h.

"LOVERS" Volume #1: Share the pleasure as you watch 20 different couples engage in intimacy. Join them? Only $69.95 + $3. p/h.

SAVE $25.00 - Order both titles for only $114.95 plus $5.00 postage & handling

To order by phone call: (818) 993-5629
Visa / MasterCard / American Express
By mail - Send Check or Money Order to:
"REG PUBLISHING", Dept 1A
POB 5138, Chatsworth, CA 91313
Requires an IBM/PC & Windows 3.1
Will work with DOS viewing programs, too.
Adults Only • Dealer Inquiries Invited

ImageCore

Digital Online Magazine

America's Premier BBS Offering Subscribers:

Original High Res Photos
New Uploads Daily
News Events • Celebrities
Fashion • Sports • Adult

Global Entertainment
For Your Pleasure
Group & Private Chat Lines
Shareware Programs • Games
Open Forums • Internet

World News Services
Up to the minute information
USA Today • Dow Jones
Billboard Newswire

Subscribe Today
Use your Modem 8-N-1

818-752-1380

Must be 21 to order

Where Adults Come To Play!

The World's Choice For

HOT MODEM FUN!

- HOT CHAT Live W/Thousands of Ladies & Gents in Groups & Private!
- Tons Of Sizzling Hot Message Areas, Shareware Files and Adult GIFs!
- Matchmaker With "DATING-BASE"!
- Straight and Gay Sections!
- Live Competitive Tournament Gaming!
- Unlimited Connect With One Low Price!

Local Numbers In Over 800 Cities!
Plus Much Much More!

Now With Our Exclusive FANTASY Area!

ODYSSEY BBS

For Modem Signup or More Info Call:

Over 21 (ONLY) **818-358-6968**

CIRCLE 617 ON READER SERVICE CARD

Secret City MULTIMEDIA INC.

ADULT CD ROMS

LOWEST PRICES • HOTTEST TITLES

INTERACTIVE: CD ROM
Night Watch 1 or 2
Desktop Voyeur
Adv. of Seymore Butts 1 or 2

ADULT MOVIES: CD ROM
Tracy Lords, I Love You
Devil in Miss Jones
L.A. Strippers

PHOTO DISC: CD ROM
Adult Palate Vol 1 & 2
Girls of J. Stephen Hicks

Hundreds of new titles available.
Must be 21 to order

ORDER DESK: **800-643-4205**
(818) 786-0995 • FAX (818) 786-7018

CIRCLE 618 ON READER SERVICE CARD

San Francisco's Premier Adult Gay Men's Online Service has NOW gone Nationwide!

- Local access from over 1,000 US cities!
- Live uncensored group & private chat!
- Online, interactive, multi-player games!
- Lively salon style public forums!
- Over 20,000 Adult rated GIFS & files!
- MatchMaker online databases!
- 50+ lines available 24 hours a day!
- Gay owned and operated, your privacy assured!
- ***Much, much more!***

For your local access number, information, & signup, CALL:

(415) 703-8200

Set modem to 8/N/1. You must be 21 or older.

Finally...a national adult Gay men's BBS!

EYE CONTACT

CIRCLE 619 ON READER SERVICE CARD

THE NEW PC MAGAZINE CLASSIFIED FORMAT GIVES YOU MUCH MORE FOR FAR LESS...

New Flexible Ad Sizes
More Color Options
Lower Cost-per-Inch Rates

Call your PC Magazine Marketplace account representative today at:

1-800-825-4237

and let the new Classified work for you.

PC MAGAZINE MARKETPLACE BUSINESSCARD

PC Magazine's BusinessCard section is a forum for innovative, hard-to-find and low-cost PC products and services. Ads are listed by product category and include Reader Service numbers to allow fast, easy response.

RATES:
1 issue–$800, 3 issues–$700, 6 issues–$680, 12 issues–$640, 17 issues–$610, 22 issues–$600. Multiple-ad per issue rates also available. Prepayment must accompany each insertion. VISA/MC welcomed.

AD FORMAT:
PC Magazine will typeset each BusinessCard ad. Advertisers should furnish typewritten copy. Ads include: 1) Headline (1 line, initial caps=30 characters max, all caps=25 characters max), 2) Descriptive copy (5 lines, 225 characters max), 3) Company name (same specifications as headline), and 4) Address and telephone number (2 lines, 40 characters per line). No logos, artwork or camera-ready ads. Publisher reserves the right to edit supplied copy to meet section specifications.

DEADLINES:
PC Magazine is published 22 times a year, (bimonthly except for July and August). The BusinessCard closing is approximately two months prior to issue date.

Please send copy and payment to:
PC Magazine BusinessCard
One Park Avenue, 3rd Floor
New York, NY 10016
For more information, call 800-825-4237 *or* 212-503-5115, FAX: 212-503-5860.

HARDWARE/BAR CODING

BAR CODE DISCOUNT WAREHOUSE
will not be undersold! Your source for all your bar code needs. Laser and CCD scanners, mag stripe and wedge readers, bar code printers and software. We offer major brands at the best prices.
1-800-888-BCDW

BAR CODE DISCOUNT WAREHOUSE
14761 Pearl Rd., #257, Strongsville, OH 44136
Tel: (216) 273-4746 Fax: (216) 273-4623

CIRCLE 651 ON READER SERVICE CARD

LAPTOP/PORTABLES

COMPUTERS FOR LESS
Buy where dealers and smart users buy. Save big on desktops, notebooks, expansion cards, drives, accessories, more. No fancy ads means more savings for you. FREE CATALOGUE.

Call 800-241-1096 • 24 Hours
COMPUTER DISTRIBUTION CENTRE

CIRCLE 656 ON READER SERVICE CARD

SOFTWAREVAULT COLLECTIONS
Critically acclaimed new releases! Thousands of the best shareware programs and resources on each collection. Complete libraries of best-selling games, utilities, multimedia, etc. Six different collections available!

AMERICAN DATABANKERS
5220 East 69th Place, Tulsa, OK 74136
DEALERS WANTED 1-800-775-4232

CIRCLE 661 ON READER SERVICE CARD

BATTERIES

YOU DESERVE LONGER LIFE!
Why does your "2-hr" battery only last 15 minutes? Try our extra long life Battery Packs, Chargers & Conditioners for Notebook, Cellular & Camcorders. Call or write us today for free catalog & guide to longer battery life! Guaranteed low $! V/MC or P.O.

POWER EXPRESS
4976 Stuckey Drive, San Jose, CA 95124-5120
800-769-3739 (8A-5P PST) Fax:408-559-5969

CIRCLE 652 ON READER SERVICE CARD

SOFTWARE/ACCOUNTING

FREE Windows Billing System!
Limited time! You can get our Billing System for Windows, FREE!! We know you will remain a customer of ours. Full program and manual. $8.95, non-refundable S&H. Don't miss this!

M & R Technologies, Inc.
P.O. Box 061298, Palm Bay, FL 32906-1298
Phone: (407) 951-2268

CIRCLE 657 ON READER SERVICE CARD

CD ROM DIRECT OUTLET
Buy direct from manufacturer!
Hundreds of Windows, DOS, & Mac titles. List includes programs, games, education, clipart, and GIF files. ALL TITLES ONLY 8.99 EACH!
MC/VISA, CALL FOR FREE LISTING.

INFINITI SYSTEMS, S.V.
4053 Clipper Court, Fremont, CA 94538
PH: 510-252-9030 FAX: 510-252-9039

CIRCLE 662 ON READER SERVICE CARD

COMPUTER BATTERIES & MORE
Sanyo,Tadiran, Panasonic, Eveready, Gates, Lithium, Lead Acid, Ni-Cad, Alkaline & Chargers. We stock batteries for laptop/notebook, Camcorders, cordless phones, drills, Norelco shavers, RC Cars & Invisible Fence. Corp PO #'s Wholesale! MC/VI

Battery Express
713 Gladstone St., Parkersburg, WV 26101
1-800-666-2296 Fax:304-428-2297

CIRCLE 653 ON READER SERVICE CARD

CHECK FACTORY® UNLIMITED
MICR Check printing software, signatures, logos security. Unlimited checking accounts. Easy, automatic and compatible with most accounting software. Bonus! Prints typeset quality forms. Free catalog. only $599

Trans-Micro Inc.
201 SW PSL Blvd. Ste. 203 Pt. St.Lucie, FL 34984
(800) 749-2335 Fax. (407) 878-5917

CIRCLE 658 ON READER SERVICE CARD

CD-ROMS-MAC-IBM-SEGA-CDTV
Prevue CD-ROMS. We carry all popular formats. Karaoke, Art, Lit, D/Top Publishing, Fonts, Utils, Education, Graphics and above all — GAMES. Apply Prevue to buy or return to prevue more. FREE CATALOG 1-800-433-2938.

WEDGWOOD RENTAL
5316 Woodway Dr., Fort Worth, TX 76133
1-800-433-2938 or 817-292-7353

CIRCLE 663 ON READER SERVICE CARD

CELLULAR PHONES

COMPUTER BATTERIES
Nickel Cadmium, Lithium, Lead Acid & Alkaline Batteries for PC Boards, UPS, Printers & Laptop Computers. Custom Build Battery Packs. MC/V

EVS SUPPLY
1350 Arapaho #126, Richardson, TX 75081
1-800-776-5267 FAX 214-231-2269

CIRCLE 654 ON READER SERVICE CARD

Computer Checks $24.95
Why Waste Money? Quicken compatible, also MYM, Money, Business Sense, 1200 more! Continuous or laser. Our checks ship in one week and are fully guaranteed. 100 Free Envelopes with First Order!

Designer Checks, Inc.
Box 12966E, Birmingham, AL 35202
800-239-9222 Ext. 78 Fax 205-328-3815

CIRCLE 659 ON READER SERVICE CARD

TWO PHONES - ONE NUMBER
Change NAM & ESN info on your PC for Motorola, Mitsubishi, Panasonic, NEC Cellular Phones & have an extension. Why pay two bills? Call our fax on demand for details. Only $495 with free technical support.

Cellular Press
421 N. Rodeo #15318 Beverly Hills, CA 90210
Fax/Demand: 800-438-4511 Ph: 310-289-2174

COMMUNICATIONS/NETWORKING

KEYBOARD, VIDEO, MOUSE
EXTENSION with EXTENDER
SPLITTING with COMPANION
SWITCHING with COMMANDER
Boosts SIGNALS UP to 600 FT. Control Up to 96PC's with one KEYBOARD and MONITOR.

CYBEX CORPORATION
4912 Research Drive. Huntsville, AL 35805
PHONE 205-430-4000 FAX 205-430-4030

CIRCLE 655 ON READER SERVICE CARD

CD-ROM

FREE CD-ROM DISCOUNT CATALOG!
Hundreds of discounted CD-ROM titles, from $8 up. Call or write for your free catalog.

Ellis Enterprises, Inc.
4205 McAuley #385, Oklahoma City, OK 73120
1-800-729-9500

CIRCLE 660 ON READER SERVICE CARD

CONSTRUCTION

SERVICE MANAGEMENT SOFTWARE
Instant access to customer history. Automated dispatching. Timely billing. Take charge of your business with CMAS Plus, our integrated accounting/job costing/service management system for specialty contractors.

DATA-BASICS, INC.
11000 Cedar Road•Cleveland, OH 44106
1-800-837-7574•Fax (216) 721-2398

PC MAGAZINE MARKETPLACE BUSINESSCARD

CUSTOMER SUPPORT

How to Handle Customer Support
Customer Response System™ tracks calls, inquiries & problems. Quickly finds known solutions. Easily routes work to others. Speeds response via letter/fax writer & phone autodialer. For LAN's &PC's. From $499.

Syspro Corporation
PO Box 243, Orinda, CA 94563
Tel: (510) 254-9755 Fax: (510) 254-4377

CIRCLE 666 ON READER SERVICE CARD

DATA BASE

dBASE file access from C, Basic,..
CodeBase gives complete database management with multi-user dBASE, FoxPro or Clipper file compatibility from C, C++, Basic or Pascal. *Report Writer* and *Data Entry* software is included. Full 60-day money back guarantee.

SEQUITER SOFTWARE INC.
PO Box 575 New Market, NH 03857-0575
Call (403) 437-2410, Fax (403) 436-2999

CIRCLE 667 ON READER SERVICE CARD

DATA ENTRY

The Data Entry Emulator™
Full featured, heads-down data entry with two-pass verification, edit language, operator stats, batch control, output record reformat, on-line help, free tech support. From $395. LAN version available.

Computer Keyes
21929 Makah Road, Woodway, WA 98020
800-356-0203/206-776-6443/Fax:206-776-7210

DESKTOP PUBLISHING

PCTEX Typesetting Software
** The next step beyond desktop publishing **
Use PCTEX for Windows/DOS to professionally typeset books of any size/format, technical articles, scientific notation, math & foreign languages. A complete TEX/LATEX system.

Personal TEX, Inc.
12 Madrona St., Mill Valley, CA 94941 USA
800/808-7906; 415/388-8853, Fax 388-8865

CIRCLE 669 ON READER SERVICE CARD

EDUCATION

DERIVE®, A Mathematical Assistant
Half Price! DERIVE combines power of computer algebra with 2 & 3D plotting & menu-driven interface. Does symbolic & numeric equations, calculus, trig, vector & matrix algebra & more. Req:MS DOS computer, 1 floppy disk drive & 512K. $125.

Soft Warehouse, Inc.
3660 Waialae Avenue, Suite 304
Honolulu, HI 96816-3236 (808) 734-5801

CIRCLE 670 ON READER SERVICE CARD

ENGINEERING

SIMULATION
GPSS/PC™ is full-power version of the most popular mainframe simulation language, GPSS. Designed for interactive use on high-speed microprocessors, it has 6 graphics and animation windows. It predicts behavior of complex systems.

MINUTEMAN SOFTWARE
P.O. Box 171/B, Stow, MA 01775
800-223-1430/508-897-5662 Ext.316

CIRCLE 671 ON READER SERVICE CARD

ENTERTAINMENT/GAMES

ADULT VGA SOFTWARE
Stop Paying High Prices for Adult Software! We offer the Best in Adult VGA Software at Lowest Prices. Visa & MasterCard Accepted. Movies, Games, Pictures. WE NOW SELL CD-ROMS. (You must be 18 or older to order.)

CLEARLIGHT SOFTWARE
P.O. Box 1411, Milwaukee, WI 53201
(414) 962-2616

CIRCLE 672 ON READER SERVICE CARD

FINANCIAL

Make the Most of Your Money!
Personal Budget 101 (TM) is everything you need to simplify your finances. Complete with on-screen help to guide you every step of the way. It couldn't be easier! $29.95 + $5 S&H. MS-DOS. Specify 3.5" or 5.25" disk. Chk/MO.

FINANCIAL TECHNOLOGIES
P.O. Box 44120, Lemoncove, CA 93244
(209)597-2296

CIRCLE 673 ON READER SERVICE CARD

GENEALOGY

Family Roots™
Do it YOUR way! Huge variety & capacity for your family history. Make pedigree & descendants charts, person & group sheets, indices, histories, address labels, searches, more. Call for FREE info. Satisfaction gtd. PC or Mac. MC/V/Amex/Discover

QUINSEPT
Box 216, Lexington, MA 02173
800-637-7668 617-641-2930

CIRCLE 674 ON READER SERVICE CARD

GENERAL

Student-Teacher-School SPECIAL
Pagemaker5.0 $359-WordPerfect6.0 $159-Q&A $169 Morph $90-Action! $259-LotusWindows 4 or 3.4+ $159-BorlandC++ $219-Derive2.5 DOS $250-dBase $249 Coda-Finale $299-Paradox4.0 $249-Mathematica $299-IBM/Mac Call for catalog!

PERIPHERALS PLUS, INC.
5016 Highway 9, HOWELL, NJ 07731
800-444-7369 908-363-2424 FAX:908-363-3687

CIRCLE 675 ON READER SERVICE CARD

HUMAN RESOURCE MANAGEMENT

WORKWISE-EMPLOYEE FILE
REDUCE LEGAL EXPOSURE! Document performance, days off & attendance analysis, benefits, certification expirations, EEO-1 Data, Corp. mail. Great for evaluations & multi-location WINDOW-BASED. Dealers welcome. $395.

Paradigm Software Development
2510 Western Ave #500 Seattle, WA 98121
Ph: 1-800-WORKWISE Fx: 1-206-728-8401

CIRCLE 676 ON READER SERVICE CARD

INVENTORY

WAREHOUSE INVENTORY
Barcodes identify receipts, locations, and shipments. Audit trails. Multi user. Multi languages. Options: EDI receive/ship, lottrack, expiration dates, markdowns, transfers. Connect scales, purch. orders, and cust. order entry.

BGD COMPUTER SYSTEMS, INC.
212 W. Front St. Statesville, NC 28677
Tel: 704-878-8877 Fax: 704-878-0398

CIRCLE 677 ON READER SERVICE CARD

INVENTORY MANAGEMENT

INVENTORY MANAGEMENT
Stock-Master 4.0, com. grade system, has Stock Status Rptg, PO Write & Track, Trend Analysis, QC Rptg, Trans Hist Detail Analysis, Multi Loc support, BOM, Matl Req Planning, Serial/Lot No Track, Quote/Ord/Inv Prep.

Applied Micro Business Systems, Inc.
177F Riverside Ave., Newport Beach, CA 92663
714-759-0582

CIRCLE 678 ON READER SERVICE CARD

MAILING/MAIL ORDER

SoftSpoken Mailer for Windows
Print USPS-certified barcode on ordinary mailing labels. Presort 1st/3rd class for rates as low as 11.4¢! Get ZIP+4 & forwarding addresses. De-dupe lists. Easy Windows interface. Money-back guarantee. Call for free brochure!

Micro Computer Solutions Inc.
19225 Orbit Dr., Gaithersburg, MD 20879
Tel: (800) 536-1674 Fax: (301) 990-3155

CIRCLE 679 ON READER SERVICE CARD

MAINTENANCE/PREVENTIVE MAINTENANCE

MAINTENANCE MANAGEMENT
PC-based system for the small to medium size business. FEATURES: Work Orders (space for detail instructions & safe work procedures), equipment descriptions, historical data, operating & analytical reports, inventory. Write for free Demo!!

PENGUIN COMPUTER CONSULTANTS
P.O.Box 20485, San Jose, CA 95160
800-521-0545 (408)997-7703 Fax (408)927-0570

CIRCLE 680 ON READER SERVICE CARD

MANUFACTURING

Over 3,100 Satisfied Users!
Mfg. inventory control, multi-level BOMs, integrated purchasing costs $1995. Optional scheduling module w/work orders, time-phased prod.scheduling, & MRP $800. $ back guarantee. Feature-rich demo prints 60+sample reports — Just $5. V/MC/Amex

Microcomputer Specialists, Inc.
P.O. Box 795, Woodstock, VT 05091
Call toll-free 1-800-833-1500

CIRCLE 681 ON READER SERVICE CARD

pc/MRP ACCTING/MFG SOFTWARE

pc/MRP's 12 integrated modules include Inventory, BOM, Sales, Purchasing, Receiving Invoice, StkRoom, WorkOrder, Addr, GL,AP,AR
Working Demo w manual $35.00
Sm Single User $179.00, Multi-user $695.00

Software Arts
PO Box 3621 Santa Clara, CA 95051
PHONE 408-248-6445 FAX 408-247-8610

CIRCLE 682 ON READER SERVICE CARD

MEDICAL

LYTEC MEDICAL
Advanced practice management for only $199.00. According to PC World: "This program is packed but costs only a tenth of what its competitors charge...The key features are all here." Network and Windows versions also available.

Lytec Systems, Inc.
7050 Union Park Center, Suite 390
Midvale, UT 84047 Tel:1-800-735-1991

CIRCLE 683 ON READER SERVICE CARD

PC MAGAZINE MARKETPLACE BUSINESSCARD

MEDICAL

PRACTICE BILLING
MD VersaForm,flexible,ledger based design,billing package. Programmable; customizable reports, files, & screens; includes database mgmt system & full source. ECS. LAN support. $1,295 sgl user. Free lit & demo. Dlrs wanted.

Applied Software Technology
591 W.Hamilton Ave., Ste 201, Dept. 99
Campbell, CA 95008 (800) 678-1111 Ext.99

PRACTICE BILLING - Software
Nationwide use since 1979. ELECTRONIC CLAIMS. Full support. Simple Q/A. Full pt. ledgers, stmts, reports, everything. Tutorial. On-line help. LAN compatible. Physician designed. Single User: $495+. Newsletter. FREE WORKING DEMO, virus free.

Physicians' Office Computer
1240 Kona Drive, Rancho Dominguez, CA 90220
800-782-5214

CIRCLE 685 ON READER SERVICE CARD

REAL ESTATE

Property Management
With Rental-Ease save $$ on your investment! Guaranteed to be the easiest & fastest property management system available at any price. Versions for owners, professionals, networks. $395 to $1295. Demo $10. Dealers welcome!

Strategic Office Systems
688 N.500 W.#61, Mt. Pleasant, UT 84647
(800) 942-6784 or (801) 462-2130

CIRCLE 690 ON READER SERVICE CARD

The Landlord® & The Landmaster®
Property management software purchased by more than 5,000 owners and property managers since 1980. Handles residential and commercial tenant accounting; prints checks and statements. G/L and A/P included. From $595 to $2200.

The Landlord Software Center
427 East Patrick Street, Dept. E
Frederick, MD 21701 (301) 695-1544

CIRCLE 691 ON READER SERVICE CARD

SCIENTIFIC

CoPlot - 2D and 3D Scientific Graphs
Publication-quality output. Very flexible. With features that scientists need: error bars, sub/super scripts, and the full Greek alphabet. John Dvorak says: "Don't let the low price fool you; this is excellent software." $159

CoHort Software
P.O. Box 1149, Berkeley, CA 94701
(800) 728-9878 Fax (510) 524-9199

CIRCLE 696 ON READER SERVICE CARD

EXPERIMENTAL DATA FITTING
SCIENTIST is a new program dedicated to fitting any combination of user-defined algebraic and differential equations, implicit equations, multivariate equations, and linear and non-linear equations.

MicroMath Scientific Software
Box 21550, Salt Lake City, UT 84121-0550
1-800-942-6284 Fax (801) 943-0299

CIRCLE 697 ON READER SERVICE CARD

MUSIC

SongWright Out Scores The Rest
"Impressive output...solid list of features."
An Electronic Musician survey proves SongWright the BEST BUY of all music notation software. Save hundreds of dollars. Make your music easy with SongWright. Only $119.95.

SongWright Software
7 Loudoun Street S.E., Leesburg, VA 22075
(800) 877-8070 (703) 777-7232

Midi Music With The Human Touch!
Pop, Rock, Country, Oldies - We've Got It All!
The most widely used midi music in the world. Over 1800 titles available for most systems - Including General Midi Oriented Midi Files. Order direct with your AMEX, VISA, MC -

TRYCHO MUSIC INTERNATIONAL
2166 W. Broadway, #330, Anaheim, CA 92804
(800) 543-8988 FAX: (909) 696-3571

CIRCLE 687 ON READER SERVICE CARD

PROPERTY MANAGEMENT
Since 1978 over 7,500 users of our software have found it comprehensive, flexible & easy to use. We offer systems to manage: Commercial/Residential/Condominium/Homeowners/Assoc./Mini-Storage Facilities. For info. & prices call:

REALTY AUTOMATION
11365 East Shore Drive, Hayden Lake, ID 83835
(208) 772-3259

CIRCLE 692 ON READER SERVICE CARD

Property Management
Software for managing residential, commercial, condos, etc. Basic version for owner/manager- $495, Deluxe for professional managers- $1,195, Network-$2,395. Includes check writing, recurring expenses, G/L, management reporting.

YARDI SYSTEMS, INC.
819 Reddick Street, Santa Barbara, CA 93103
(805) 966-3666

CIRCLE 693 ON READER SERVICE CARD

STATISTICS

NCSS 5.x Series - $125
"Best value & easiest to learn/use" PC-Week. Menus/Spreadsheet. Means, etc. Regression, t-tests, ANOVA. Factor, cluster & discriminant. Cross tabs. Nonparametrics. Histograms. Plots. Reads ASCII/Lotus. Many extra modules.

NCSS
329 North 1000 East, Kaysville, UT 84037
Phone: 801-546-0445 FAX: 801-546-3907

CIRCLE 698 ON READER SERVICE CARD

SURVEYS

The Survey System
Analyzes:marketing, public opinion, customer satisfaction, employee attitude surveys. Handles mail, personal, phone, scanner, disk-by-mail or computer interviews. Records verbatim text & voice answers. Powerful, flexible, user friendly. Free support.

Creative Research Systems
140 Vista View #100, Petaluma, CA 94952-4728
Ph.(707)765-1001/Fax (707)765-1068

PROGRAMMERS TOOLS

BASIC PROGRAMMING TOOLS
Crescent offers many tools for QuickBASIC, PDS, and Visual Basic, all with tutorials and full source. Assembly routines, graphics, screen design w/data entry, BASIC TSR's, and much more. No royalties. Call or write for our catalog.

CRESCENT SOFTWARE, INC.
11 Bailey Avenue, Ridgefield, CT 06877
Orders: 800-35-BASIC, Tech: 203-438-5300

SHARE YOUR MODEMS!
Using Connection Manager. Full featured, non-dedicated modem server. IPX or NetBIOS. Std serial ports or multiport boards. NASI and I14 support. $195-Lite, $395-Std. $ back guarantee. 30 day free trial on our BBS.

SOFTWAREHOUSE CORPORATION
326 State Street, Los Altos, CA 94022
415-9490203Fax 415-9490208BBS415-9490207

CIRCLE 689 ON READER SERVICE CARD

RELIGION

CHURCH MANAGEMENT SOFTWARE
Membership, contributions and accounting software that saves big on church mailing costs with bar codes and carrier routes. PowerChurch Plus includes church fund accounting, A/P and payroll for $795. Call today to order free info in the mail.

F1 SOFTWARE
208 Ridgefield Drive, Asheville, NC 28806
1 (800) 486-1800

CIRCLE 694 ON READER SERVICE CARD

QUR' AN & ISLAMIC SOFTWARE
The Alim lets you search and study the Qur'an, Hadith, Figh, Islamic history, biographies, commentaries, dictionaries, concordances, and more! All in one inexpensive integrated package with both Arabic and English support!

ISL SOFTWARE CORPORATION
2037 Featherwood St, SS, MD 20904 USA
800-443-3636, 713-893-0805/0558 fax

CIRCLE 695 ON READER SERVICE CARD

UTILITIES

PEN PLOTTER EMULATOR
FPLOT turns your printer into an HP pen plotter. Fast hi-res, no jagged lines. Vary line width, color. Screen preview - zoom, pan. Works with most CAD programs. Supports most printers. Requires DOS 2.1 or higher. $119+$3 S&H. VISA/MC/Chk/MO.

FPLOT Corporation
24-16 Steinway St., Suite 605
Astoria, NY 11103 • 718-545-3505

CIRCLE 700 ON READER SERVICE CARD

FAST LOAD - DISK SPEED-UP
Fast Load keeps files in E/XMS for ultrafast access/exec. Faster, safer and more compact than disk cache or RAM disk. Speeds up your existent disk cache, too. Great for networks (under 5K RAM). Price: $49. VISA/MC/AMEX

OMEGA POINT, INC.
25 Birch Road, Framingham, MA 01701
TEL: (508) 877-1819 FAX: (508) 877-0915

PC MAGAZINE MARKETPLACE BUSINESSCARD

UTILITIES

Pinpoint PC Bottlenecks
- Personal Measure shows how apps spend time.
- Upgrade or replace PCs based on hard facts.
- Identify network trouble spots.
- Resolve app problems using our services.
- $125 + S&H (5.25" or 3.5") MC/VISA

SPIRIT OF PERFORMANCE, INC.
73 Westcott Road, Harvard, MA 01451
tel. 508/456-3889, telex 6503571400

CIRCLE 702 ON READER SERVICE CARD

Data Recovery Services
Data recovered from PC's, Laptops, Notebooks, PS/2's and Clones. DOS, Novell, Unix, Xenix, OS/2 & other op. systems. All drives and all failures. Training and Data Recovery software avail. Saving data since 1983.

CPR & Recovery Services
11440 Okeechobee Rd. #200 (800)765-9292
Royal Palm Bch., FL 33411 (407)586-0011

CIRCLE 708 ON READER SERVICE CARD

SUPPLIES

TAPES & DISKETTES CHEAP!!

	2000	2120	600A	6150	6250	6525
Maxell	10.00	13.50	14.25	14.50	17.25	20.75
Verbatim	11.00	14.50	15.25	15.50	19.50	22.50
3 M	11.25	14.75	15.50	16.25	20.00	23.00

3 1/2 HD Formatted Plastic Case w/labels @.60

TJ ENTERPRISES
405 South Main Street, Urbana, OH 43078
Tel: 1-800-280-3475 Fax: (513)-652-4720

CIRCLE 714 ON READER SERVICE CARD

VOICE/FAX

Write your own Voice Mail software
Create advanced, multi-line voice/fax mail systems with VOS™, the Editors' Choice. Complete language for computer/telephone integration. Call for free booklet "Get into Interactive Voice".

PARITY SOFTWARE
870 Market St., #800, San Francisco, CA 94102
415-989-0330 (Fax: 415-989-0441)

INSURANCE

Insures Your Computer
The Computer Owners Insurance Policy provides replacement of hardware, media and purchased software. As little as $49 a yr covers theft, accidents, power surges and more! Now available in Ontario!! For info and to start coverage call:

Safeware, The Insurance Agency Inc.
PO Box 02211, 2929 N. High St.
Columbus, OH 43202 1-800-800-1492

CIRCLE 709 ON READER SERVICE CARD

TRAINING/TUTORIALS

Throw Out the Manuals
Video's the easy way to learn. Save by renting. A two week rental, including S&H, costs about a dollar a day. Over 90 different titles for Windows, DOS, Excel, Word, WordPerfect, PageMaker, Lotus, etc. Get a free catalog.

CareerTAPES® Enterprises
PO Box 309, Center Harbor, NH 03226
(603) 253-7470

CIRCLE 715 ON READER SERVICE CARD

BOOKS/CATALOGUES

COMPUTER BOOKS at a discount
Our free catalog lists books from over 100 publishers. 15% discount. Personal, tech svc. Networks, Windows,CDROM, UNIX, Internet, TCP/IP, Pentium, CompuServe 70007, 1333 from Internet, NiftyServe. MC/VI/AX/DSC/JCB. Worldwide shipping.

CompuBooks
Rt. 1, Box 271-D, Cedar Creek, TX 78612
800-880-6818 512-321-9652 FAX 512-321-9652

CIRCLE 704 ON READER SERVICE CARD

ON-LINE SERVICES

SHAREWARE JUKEBOX VOL I
Over 600 megabytes of shareware files! (Over 1 gigabytes uncompressed). Easy to use end user interface. Fully BBS ready (PC Board & Wildcat file listings included). Get your copy today, only $19.95 (Offer expires on Jan. 31, 1994).

6397 Little River Tnpk. Alexandria, VA 22312
Order 703-642-5121 Fax Inquiry 703-642-5122

CIRCLE 710 ON READER SERVICE CARD

Your Success Is In The Cards...
In the PC Magazine Marketplace BusinessCard pages. Advertise in every issue—pay less and increase impact.

BusinessCard
Call your BusinessCard representative today.
1-800-825-4237

CIRCLE 716 ON READER SERVICE CARD

CREATIVE VIRTUAL REALITY
Powerful guide to high-tech graphics, leads readers through all the steps in building virtual worlds. Now with real world simulation disk. IBM & compatibles. U.S. $35.95 CAN $45.95. Write now and get our free catalog.

NORTH DISTRIBUTORS
260 Davis Dr. #303 Newmarket, ONT L3Y7C3

CIRCLE 705 ON READER SERVICE CARD

DATA CONVERSION

TAPE CONVERSION & DUPLICATION
ALL TAPE TYPES (1/4", TEAC, 4mm DAT, 8mm EXABYTE, DEC TKxx, 1/2", 3480, 3490) & All Formats (MICRO, NETWORK, UNIX, MINI & MAINFRAME) - Very Fast Turnaround & Realistic Pricing. Full Service for Data Recovery including Overwrites.

VOGON
USA 405-321-2585 Fax: 405-321-2741
UK 44+(0)734-890042 Fax: 44+(0)734-890040

CIRCLE 706 ON READER SERVICE CARD

DATA RECOVERY SERVICES

ONTRACK DATA RECOVERY
Ontrack is the leader in professional data recovery services - recommended by Conner, Iomega, Maxtor, Micropolis, Quantum, Rodime, Seagate, Western Digital, & others! See our ad in the Classified section for more information.

Ontrack Data Recovery
MN: 1-800-872-2599•CA: 1-800-752-7557
UK: 44-81-974-5522•Germany: 0130-815-198

CIRCLE 707 ON READER SERVICE CARD

88% OF PC MAGAZINE SUBSCRIBERS PURCHASED COMPUTER PRODUCTS DIRECT IN THE PAST 12 MONTHS ...

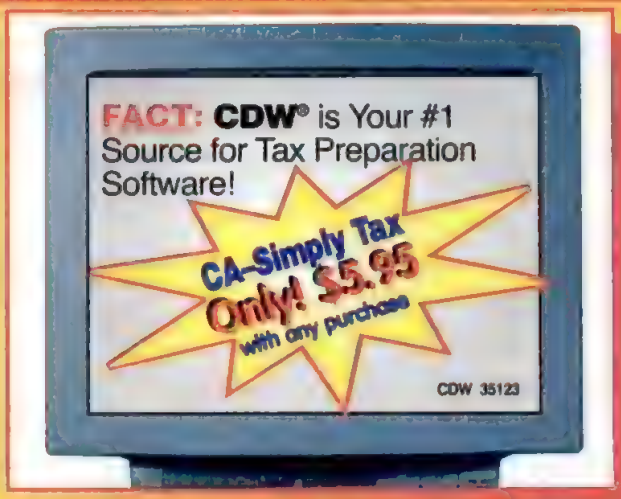
	% OF SUBSCRIBERS
Software	79%
Peripherals	61%
Supplies	57%
Computers	48%
Networking Products	14%

Sell your products direct here, call your Marketplace account representative today at 800-825-4237

PC MAGAZINE MARKETPLACE

COMPUTER DISCOUNT WAREHOUSE™

ANOTHER FACT ABOUT COMPUTER DISCOUNT WAREHOUSE™



WHY PAY RETAIL? CDW® SELLS SOFTWARE FOR LESS!

5TH GEN FASTBACK PLUS WIN
[illegible]
ALDUS PAGEMAKER V5.0
ARTISOFT LANTASTIC SOFTWARE
ARTISOFT LANTASTIC AI V5.0
ARTISOFT LANTASTIC AI V5.0 WIN
ATI MEDIA MERGE V1.0

NEW

BORLAND OFFICE V2.0 for Windows
VERSION UPGRADE
ONLY $234.34
CDW 34899

AUTODESK AUTOSKETCH WIN
BERKELEY AFTER DARK
BITSTREAM FACELIFT FOR WP V2.0
[illegible]
BORLAND C++ V4.0
BORLAND C++ V4.0 COMP UPG
BORLAND TURBO C++ VISUAL ED WIN
BORLAND DBASE IV V2.0 LICENSE NODE
BORLAND DBASE IV V2.0
[illegible]
BORLAND OFFICE V2.0
BORLAND PARADOX V4.5 DOS UPG
[illegible]
BORLAND PARADOX V4.5 WIN
QUATTRO PRO/DOS V5.0 CALL
QUATTRO PRO/WIN V5.0 CALL
[illegible]
BORLAND OFFICE V2.0 VERS UPG
[illegible]
BRODERBUND PRINTSHOP DLX WIN
BRODERBUND AUTOMAP WIN
CAERE OMNIPAGE PRO V2.1
CENTRAL POINT BACKUP V2.0 WIN
CENTRAL POINT PC TOOLS V9.0
CENTRAL POINT PC TOOLS WIN
TURBOTAX HEADSTART 1993 1040 WIN
TURBOTAX HS '93 1040 W/QUICKEN DOS
TURBOTAX HS '93 1040 W/QUICKEN WIN
CALERA WORDSCAN+ V2.0b WIN
CA CLIPPER V5.2 COMP UPG
CONNECT EMAIL CONNECTION
COREL DRAW V3.0 WITH CD
COREL DRAW V4.0 WITH CD
COREL DRAW V4.0 UPG
COREL SCSI!
CLARIS FILEMAKER PRO V2.1 WIN
[illegible]
DCA CROSSTALK V2.1 WIN
[illegible]
DELRINA WINFAX PRO V3.0
DELRINA WINFAX PRO NETWORK
ECLIPSE FAX WITH OCR
XTREE GOLD V3.0
GENERIC CADD V6.1
HAYES SMARTCOM WIN
HELIX NETROOM 1 USER
IBM OS/2 V2.1
[illegible]

[illegible]
INSET SYSTEMS HIJAAK PRO V2.0
INTEL FAXABILITY PLUS OCR V2.0
INTUIT QUICKBOOKS/WIN V2.0
INTUIT QUICKEN WINDOWS V3.0
INTUIT BUNDLE QUICKBOOK & QUICKPAY
INTUIT QUICKBOOKS V2.0 DOS
INTUIT QUICKEN DOS V7.0
INSIGNIA ACCESS PC V3.0
KODAK PHOTO CD ACCESS/WIN
LASERTOOLS PRINT CACHE
LOTUS 123 V3 4A SERVER
LOTUS 123 V2 4 NODE
LOTUS 123 V4.01 WIN
LOTUS 123 V4.01 WIN LIC
CC MAIL 10 USER PACK
LOTUS ORGANIZER V1.1
LOT AMIPRO/WIN V3.01
LOTUS V3.4A UPG
LOTUS AMIPRO V3.01 COMP UPG
LOTUS SMARTSUITE UPG V2.1
LOTUS AMIPRO/WIN V3.01 VERS UPG
LOTUS 123/WIN V4.01 UPG
LOTUS FREELANCE GRAPHICS V2.01 UPG
LOTUS FREELANCE GRAPHICS V2.01
LOTUS 123 V2.4
LOTUS 123 2.4 UPG KIT
LOTUS IMPROV/WIN V2.0
MICROCOM CARBON COPY PLUS V6.1
MICROCOM CARBON COPY/WIN
PROCOMM PLUS/WIN
PROCOMM PLUS V2.01
MICROGRAFX ABC FLOWCHARTER/WIN
THE UNINSTALLER V2.0
MICROSOFT FORTRAN V5.1
MICROSOFT MACRO ASSEMBLER V6.1
MS OFFICE V4.0 WIN VER UPG
MS OFFICE V4.0 WIN COMP UPG
MICROSOFT OFFICE COMP UPG
MS OFFICE V4.0 WIN
[illegible]
[illegible]
MICROSOFT VISUAL BASIC/WIN V3.0

NEW

MICROSOFT EXCEL V5.0 for Windows
VERSION UPGRADE
ONLY $97.27
CDW 33553

MICROSOFT VISUAL C++ COMP UPG
MICROSOFT VISUAL C++ PRO UPG
MICROSOFT VISUAL C++ PRO
MS VISUAL C++ WINDOWS NT
[illegible]
MICROSOFT WINDOWS V3.1 UPG
MICROSOFT WINDOWS V3.1 LIC
[illegible]
[illegible]
[illegible]
MICROSOFT EXCEL V5.0
MS EXCEL V5.0 VERS UPG
MICROSOFT EXCEL LIC

MICROSOFT WORKS/DOS V3.0
MICROSOFT WORKS/WIN V3.0
MICROSOFT PROJECT
MICROSOFT ACCESS V1.1 UPG
MICROSOFT ACCESS V1.1
MICROSOFT ACCESS DIST KIT
MICROSOFT ACCESS V1.1 LICENSE
[illegible]
MICROSOFT DOS V6.2 UPG
MICROSOFT DOS V6.2 UPG 3 PACK
MICROSOFT PUBLISHER V2.0
MICROSOFT MULTIMEDIA GOLF/WIN
[illegible]
MS VISUAL BASIC PRO/WIN V3.0
MICROSOFT VISUAL BASIC V3.0
MS WIN/WRKGRPS ADD-ON V3.11
MS WIN/WRKGRPS ADD-ON LIC
MICROSOFT WINDOWS PRINTING SYS
MICROSOFT FOXPRO V2.5 WIN UPG
MS FOXPRO 2.5 DIST KIT UPG WIN
MICROSOFT FOXPRO V2.5 COMP WIN
MICROSOFT FOXPRO V2.5 WIN

MICROSOFT WORKGROUPS ADD-ON V3.11
FOR WINDOWS
ONLY $49.92
CDW 33146

MICROSOFT FOXPRO COMP V2.5 DOS
MICROSOFT FOXPRO V2.5 FOR DOS
MICROSOFT FOXPRO DIST V2.5 DOS
MICROSOFT FOXPRO WIN DIST KIT
MICSFT FOXPRO DOS V2.5 DIST KI
MICROSOFT PROFIT V1.0 WIN
MICROSOFT WINDOWS NT V3.1 VERS
MICROSOFT WINDOWS NT V3.1 SING
MICROSOFT POWERPOINT V3.0 WIN
MICROSOFT WINDOWS V3.1
MOON VALLEY ICON HEAR IT
NORTON CLOSE UP HOST & REMOTE
ONLINE OPTINET 1-8 USERS
PACIFIC MICRO MAC IN DOS
PEACHTREE ACCOUNTING/WIN V2.0
POWERUP CALENDAR CREATOR PLUS
POWERUP CALENDAR CREATOR + WIN
QUALITAS 386 MAX V7.0
QUARTERDECK DESQVIEW 386 V2.6
QUARTERDECK QEMM V7.0.1
QUARTERDECK QEMM V7.0 UPG
QUARK EXPRESS
SOFTWARE PUB OFFICEWRITER V6.2
SPC PRO FILE & WRITE
SPC HARVARD GRAPHICS V3.06
SPC HARVARD GRAPHICS WIN V2.0 UPG
SPC HARVARD GRAPHICS WIN V2.0
SPC HARVARD GRAPHICS V3.0 NODE
SABER LAN WORKSTATION V1.0
SABER LAN WORKSTATION NODE LIC
CDW 5 CD-ROM BIZ BUNDLE
[illegible]
CDW CD ROM ENTERTAINMENT BUNDLE

LOTUS SMARTSUITE V2.1 for Windows
UPGRADE
$284.96
CDW 32689

SHAPEWARE VISIO V2.0
SPINNAKER FORMWORX/WIN V2.0
SOFTKEY PRECISION MAPPING
STACKER V3.1 SPECIAL DOS V8.0
STACKER V3.1 WINDOW/DOS
STACKER FOR OS/2 V1.0
SWIFTE LETTERHEAD FOR WORD
SYMANTEC Q&A V4.0 WIN
SYMANTEC DIRECT ACCESS V5.1
SYMANTEC FASTBACK PLUS V6.0
SYMANTEC ACT V1.1 FOR WINDOWS
SYMANTEC ACT V2.1DOS
SYMANTEC PC ANYWHERE V4.5
SYMANTEC PC ANYWHERE V4.5 REMOTE
SYMANTEC NORTON SPEEDRIVE V4.0
SYMANTEC NORTON DESKTOP/WIN V3.0
SYMANTEC ANTI VIRUS V3.0
SYMANTEC NORTON UTILITIES V7.0
SYMANTEC PC ANYWHERE WIN
SYMANTEC Q&A 4.0 DOS
SYMANTEC Q&A LAN PACK 4.0
TRAVELING SW COMMWORKS WIN
TRAVELING SW LAPLINK V
WORDPERFECT V6.0 DOS LICENSE
WORDPERFECT/WIN V6.0 LICENSE
WORDPERFECT/WIN V5.2 NODE W/DOC
WORDPERFECT OFFICE SERVER V4.0
[illegible]
WP PRESENTATIONS V2.0 W/SCNR
WORDPERFECT/WIN V5.2
WORDPERFECT/WIN V6.0
WORDPERFECT/WIN V5.2 LIC
[illegible]
[illegible]
WP V6.0 WIN W/QUATTRO COMP UPG
WP V6.0 DOS LIC UPG
WP OFFICE V4.0 CLIENT PK UPG
[illegible]
WORDPERFECT/DOS V6.0 UPG
WORDPERFECT/WIN V5.2 UPG
WORDPERFECT/WIN V6.0 UPG

WORDPERFECT V6.0 for Windows
VERSION UPGRADE
ONLY $98.74
CDW 31968

[illegible]
[illegible]
[illegible]
[illegible]
[illegible]

CDW® HOME
[illegible]

CDW
CM863

WE SELL NAME BRAND ITEMS FOR LESS!
(800)-337-4CDW
NASDAQ
CDW® is a NASDAQ traded company
TICKER SYMBOL: CDWC
D & B Rated 4A1 Duns 10-762-7952

FAX (708) 291-1737

Turn the Page For More CDW® Savings!

No Surcharge For Credit Cards

High Volume Bids Invited

©1994 CDW® Computer Centers, Inc

COMPUTER DISCOUNT WAREHOUSE™

COMPUTER DISCOUNT WAREHOUSE™

COMPUTER DISCOUNT WAREHOUSE

Canon

BJ-200e NEW!

- ✔ 360 dpi BubbleJet Printer
- ✔ Up to 33% Faster than BJ-200

ONLY $298.24 CDW 34907

BJC-600

- ✔ 360 dpi Color BubbleJet Printer
- ✔ Optimized for Plain Paper
- ✔ Laser-quality Text Output

CDW TOP SELLER

ONLY $588.50 CDW 32009

WHY PAY RETAIL?

CDW® Sells For Less

AST

While Supplies Last!

AST Advantage! i486SX/25 Desktop Computer

- i486SX/25
- 170MB Hard Drive
- MS-DOS V6 X, Windows V3 1, Mouse

w/ 2MB ONLY $859.00

w/ 4MB ONLY $959.00

HARDWARE, SOFTWARE & PERIPHERALS AT DISCOUNT PRICES

NETWORKING PRODUCTS

NOVELL

Netware V4.01

5 USER CD 899.00
10 USER CD 2064.00
25 USER CD 3036.00
50 USER CD 3960.00

Netware V3.12

5 USER 3.5" 599.00
10 USER 3.5" 1064.00
25 USER 3.5" 2316.00
50 USER 3.5" 3131.00
100 USER 3.5" 4288.00

Call for Pricing on NetWare CD-ROM Versions and Upgrades

PERSONAL NETWARE V1.0 NEW

1 USER 89.00
5 USER 344.00

NOVELL PRICING IS SUBJECT TO CHANGE. PLEASE CALL CDW FOR THE MOST CURRENT PRICING.

NE2000 PLUS ETHERNET COAX CARD 109.00
NE3200 THIN COAX w/TPA 399.00

ACTIVE

COACTIVE STARTER KIT 199.00
COACTIVE ADD-ON KIT 139.00

THOMAS-CONRAD

TC5143 ETHERNET COAX 119.87
TC5143 ETHERNET COAX 6PK 699.56
TC5143 ETHERNET 10BT 89.95
TC5143 ETHERNET 10BT 6PK 483.77
TC6242 ARCNET 8 BIT COAX CARD 99.59
TC8245 ARCNET COAX CARD 179.99
TC6242 ARCNET+ TP CARD 95.94
TC8245 ARCNET ALL IN-ONE CARD 258.84
TC8040 ARCNET PASSIVE 4 PORT HUB COAX 39.50
TC8151 ARCNET 16 PORT SMART HUB COAX 1366.27
TC4045 TOKEN RING 16/4 CARD 279.89
TC4045 TOKEN RING 16/4 CARD 356.44
TCNS 100MBPS COAX CARD 436.57
TCNS 100MBPS EISA COAX CARD 600.91
TCNS 100MBPS STP CARD 447.66
TCNS 100MBPS FIBER OPTIC CARD 716.00
TCNS 100MBPS 8 PORT SMART HUB COAX 1366.27
TCNS 100MBPS 8 PORT SMART HUB COAX 1149.47
TCNS 100MBPS 8 PORT SMART HUB STP 1166.75
TCNS 100MBPS 8 PORT SMART HUB FIBER 1486.80

ARTISOFT

AE3 ETHERNET COMBO CARD 199.00
NODERUNNER 2000A 217.34
NODERUNNER 2000T 178.47
NODERUNNER 2000C 172.47
NODERUNNER/S 2000A 119.00
NODERUNNER/SI 2000T 82.44
NODERUNNER/SI 2000C 80.44
CENTRAL STATION II 389.00
10BT 5 PORT INTERNAL HUB 255.33
NODERUNNER STARTER KIT WINDOWS 409.57
LANTASTIC AI V5.0 ..... 79.12
LANTASTIC AI V 5.0 WINDOWS 79.19
LANTASTIC SOFTWARE 89.80
LANTASTIC FOR WINDOWS SW 129.88
T-RUNNER 8 PORT 10BT 299.68
T-RUNNER 12 PORT 10BT 469.41

SMC®

ULTRA16 ETHERNET COAX 109.35
ULTRA16 ETHERNET COAX 6PK 599.00
ULTRA16 ETHERNET 10BT 89.00
ULTRA16 ETHERNET 10BT 6PK 599.00
ULTRA16 ETHERNET COMBO 129.00
ULTRA16 ETHERNET COMBO 6PK 699.00
ETHERCARD+ ELITE 8 BIT COAX 99.00
ETHERCARD+ ELITE COAX 109.00
ETHERCARD+ ELITE COAX 6PK 599.00
ETHERCARD+ ELITE MCA COAX 169.00
ETHERCARD+ ELITE 10BT 119.00
ETHERCARD+ ELITE 10BT 6PK 699.00
ETHERCARD+ ELITE MCA 10BT 189.00
ETHERCARD+ ELITE EISA 10BT 249.00
ETHERCARD+ ELITE COMBO 149.00
ETHERCARD+ ELITE COMBO 6PK 799.00
3608 ETHERNET 8 PORT CON 10BT 2999.00
3512 ETHERNET 12+2 PORT CON 10BT 4999.00
PC600WS ARCNET CARD COAX 119.00
PC650WS ARCNET CARD TP 119.00
PC800FS ARCNET CARD COAX 199.00
PC130 ARCNET CARD COAX 129.00
ARCNET 8 PORT ACTIVE HUB COAX 399.00
TOKENCARD ELITE 16/4 ..... 399.00

NETWORKING PRODUCTS

3Com®

3C503 ETHERLINK II COAX 184.84
3C509 ETHERLINK III COAX 115.00
3C509 ETHERLINK III COAX 5 PK 535.12
3C509 ETHERLINK III 10BT 119.00
3C509 ETHERLINK III 10BT 5 PK 527.37
3C509 ETHERLINK III MCA 10BT 237.45
3C529 ETHERLINK III MCA COAX 5PK 999.44
3C529 ETHERLINK III MCA 10BT 5PK 979.00
3C509 ETHERLINK III COMBO 139.00
3C509 ETHERLINK III COMBO 5 PK 579.84
3C579 ETHERLINK EISA COAX 229.91
3C579 ETHERLINK EISA 10BT 229.91
3C1627 12 PORT LINKBUILDER 10ST 999.87

Xircom

PE310BC POCKET ETHERNET COAX 309.99
PE310B2 POCKET ETHERNET COAX 258.00
PE310BT POCKET ETHERNET 10BT 268.31
PA202B6 POCKET ARCNET COAX 229.30
PT216BT POCKET TOKEN RING 16/4 ..... 529.14
POCKET TOKEN RING III 455.89
PPX03 PARALLEL PORT MULTIPLEXOR 79.80
XIRCOM 14.4K POCKET MODEM 509.19

IBM TOKEN RING

IBM TOKEN RING 16/4 ISA 501.40
IBM TOKEN RING 16/4 MCA 625.35
IBM TOKEN RING MAU 458.84

intel

ETHEREXPRESS 16 COAX 99.34
ETHEREXPRESS 16 COAX 5PK 454.13
ETHEREXPRESS 16 COAX 20PK 1691.18
ETHEREXPRESS MCA COAX 129.00
ETHEREXPRESS 16 10BT 129.00
ETHEREXPRESS 16 10BT 5 PK 399.00
ETHEREXPRESS 16 10BT 20PK 1599.00
ETHEREXPRESS MCA 10BT 149.00
ETHEREXPRESS 16 [illegible] 149.00
ETHEREXPRESS 16 COMBO 5PK 599.00
ETHEREXPRESS 16 COMBO 20PK 2199.00
ETHEREXPRESS FLASH 10BT 149.00
ETHEREXPRESS FLASH 10BT 5PK 599.00
ETHEREXPRESS FLASH COMBO 179.00
ETHEREXPRESS FLASH COMBO 5 PK 699.00
ETHEREXPRESS EISA COAX 199.00
TOKENEXPRESS 16/4 ..... 399.00
NETPORT II COAX 599.00
NETPORT II 10BT 599.00
ETHEREXPRESS ISA HUB 1199.00
ETHEREXPRESS ISA HUB EXP 1499.00

TAPE, REMOVABLE & FLOPPY DRIVES

COLORADO MEMORY SYSTEMS INC.

JUMBO 120MB INTERNAL 197.21
JUMBO 250MB INTERNAL 187.34
TRAKKER 120MB PARALLEL PORT 219.45
TRAKKER 250MB PARALLEL PORT 335.44
POWERTAPE 2GB SCSI INTERNAL 947.58
POWERTAPE 2GB SCSI EXTERNAL 1087.99
POWERDAT 2GB SCSI INTERNAL 1524.33

i-MEGA

TAPE 250MB INSIDER HH 187.87
FLOPTICAL 21MB INSIDER 279.37
BERNOULLI 150MB INSIDER SCSI 679.11
BERNOULLI 150MB PC POWERED 477.87
BERNOULLI 150MB TRANSPORTABLE 879.38
BERNOULLI 150MB INSIDER IDE 472.89

SUMMIT

SE120 120MB INT TAPE B-U 139.98
SE250 250MB INT TAPE B-U 165.63
SE305 305MB INT TAPE B-U 289.90

MICROSOLUTIONS

BACKPACK 3.5" 1.44MB FLOPPY PARALLEL 177.84
BACKPACK 5.25" 1.2MB FLOPPY PARALLEL 177.84
BACKPACK 170MB HD PARALLEL 368.59
BACKPACK 200MB HD PARALLEL 427.59
BACKPACK CD-ROM PARALLEL 357.91
BACKPACK 2X CD-ROM PARALLEL 393.75
BACKPACK 250MB TAPE B-U PARALLEL 355.05

TAPE, REMOVABLE & FLOPPY DRIVES

SyDOS

PRO NOTE 42MB PARALLEL 418.17
PUMA 88MB PARALLEL 442.44
MARLIN 105MB INT IDE 478.26
88MB EXT SCSI W/ADPT 538.00

Mountain

TD-250 250MB INT IDE 189.32
FS8500 305MB INT IDE 449.50
SIDECAR II 305MB PARALLEL TBU 358.77
1200-4 4GB EXT SCSI 2035.93
750MB-1.5GB INT TBU W/ADPT 1038.19
750MB-1.5GB EXT TBU W/ADPT 1254.69

WYSE TERMINALS

WYSE 30 AMBER OR GREEN 272.89
WYSE 50 AMBER OR GREEN 355.50
WYSE 55 AMBER, GREEN, WHITE 358.48
WYSE 60 AMBER, GREEN, WHITE 379.80
WYSE 150 AMBER, GREEN, WHITE 265.45
WYSE 160 AMBER, GREEN, WHITE 329.88
WYSE 325 COLOR 519.40

MULTIMEDIA, SOUND, CD

ALTEC LANSING ACS300 SPKRS/SW 274.26
CDW 5 CD BUNDLE* 129.17
CDW 5 CD BUSINESS BUNDLE* 119.88
CDW 5 CD ENTERTAINMENT BUNDLE* 79.33
CDW 4 CD EDUTAINMENT BUNDLE * 65.16
CREATIVE LABS DISCOVERY 16 INT 418.80
CREATIVE LABS MULTIMEDIA STARTER INT 449.58
SOUND BLASTER PRO DLX 117.03
CREATIVE LABS SB 16 MCD 188.12
SOUND BLASTER 16 ASP MCD 187.79
CREATIVE LABS SB 16 SCSI 187.56
MEDIAVISION PRO AUDIO 16 BASIC 112.87
MEDIA VISION PRO AUDIO SPECT 16 ..... 161.30
MEDIAVISION PRO AUDIO STUDIO 16 ..... 214.30
MEDIAVISION PRO 16 SYSTEM II BUNDLE 757.40
MEDIAVISION MEMPHIS SYS 795.15
MS MULTIMEDIA BEETHOVEN 54.88
MICROSOFT BOOKSHELF CD 119.89
MICROSOFT WIN SND SYS V2.0 ..... 52.95
MS ENCARTA 1994 ..... 85.24
MS WIN SND SYS V2 0 W/BOARD 139.77
MICROSOFT CINEMANIA 1994 ..... 52.88
ORCHID SOUNDWAVE 32 ..... 219.72
ORCHID GAMEWAVE 32 ..... 148.88
PROCOM INT MULTIMEDIA STATION 739.18
PROCOM EXT MULTIMEDIA STATION 789.48
SONY DSKTOP LIBRARY INT 2X 267.04
SONY DSKTOP LIB INT W/SND 2X 467.73
SONY DSKTOP LIB EXT W/SND 2X 548.54
TURTLE BEACH MULTISOUND 427.88

*AVAILABLE ONLY WITH CD-ROM DRIVE PURCHASE. CALL FOR DETAILS.

CD-ROM & OPTICAL DRIVES

CHINON CDS535 INT CD-ROM KIT 385.60
CHINON CDX535 EXT CDROM KIT 455.88
HITACHI 1900S EXT CD-ROM 499.85
HITACHI CDR1950 EXT 539.64
HITACHI 6700 INT CD-ROM 409.85
HITACHI CDR6750 INT 417.78
NEC 3XI INTERNAL 479.99
NEC 3XE EXTERNAL 558.92
NEC 3Xp Portable 427.59
ORCHID CDS3110 INT 229.83
PIONEER DRM604X 6 DISC QUADRASPIN 1149.00
PROCOM 200MS INT SCSI CD-ROM 452.09
PROCOM 200MS EXT SCSI CD-ROM 557.65
SONY CDU535 INT CD-ROM 265.72
SONY CDU54101 INT SCSI CD-ROM 349.15
SONY CDU7205N EXT CD-ROM 463.19
SYDOS PARALLEL PORT CD-ROM 299.51
TEXEL 3028 240MS INT KIT ..... CALL!
TEXEL 3028 W/PA SPECTRUM 16 ..... CALL!
TEXEL 5028 240MS EXT KIT ..... CALL!
TEXEL 5028 W/PA SPECTRUM 16 ..... CALL!
TOSHIBA 3401 INT SCSI CD-ROM 382.60
TOSHIBA 3401 INT SCSI CD-ROM W/ADPT 535.14
TOSHIBA 3401 EXT SCSI CD-ROM 489.61
TOSHIBA 3401 EXT SCSI CD-ROM W/ADPT 649.55
TOSHIBA 3401 EXT SCSI 4 DRIVE TOWER 2536.08

PLOTTERS, DIGITIZERS & SCANNERS

HURTTA

IS/ONE 12 X 12 4 BUTTON 299.95
IS/ONE 12 X 12 12 BUTTON 399.83
XLP 12 X 12 4 BUTTON & STYLUS 319.83
XLP 12 X 18 16 BUTTON 442.80
XGT 12 X 12 ..... 343.80

CalComp

DB III 12X12 4 BUTTON 304.84
DB III 12X12 16 BUTTON 304.84
DB III 12X18 W/PRES PEN 399.85
DB III 12X18 16 BUTTON CORDLESS 696.85
SLATE 12X12 W/PRES PEN 363.40
SLATE 12X12 W/16 BUTTON 239.91

Canon NEW

IX4015 COLOR SCANNER 1339.82

Summagraphics

SUMMASKETCH III 12 X 12 16 BUTTON 383.99
SUMMASKETCH III 18 X 12 4 BUTTON 634.44

IH HOUSTON INSTRUMENT

HI 7100 A-D SIZE 8 PEN 2899.75
HI 7200 A-F SIZE 8 PEN 3997.33

HEWLETT PACKARD

HP SCANJET IIP 737.18
HP SCANJET IIP DOCUMENT FEEDER 899.89
HP SCANJET IICX W/ ISA 849.89
HP SCANJET IICX DOCUMENT FEEDER 474.72
IICX TRANSPARENCY ADAPT. 699.89

EPSON

ACTIONSCANNER ES800C 799.99
ES800C PARALLEL/SCSI 1099.21
ACTIONSCANNER ES800C 1065.00
ACTIONSCANNER ES800C PRO 1299.53

VIDEO PRODUCTS

VGA & SUPER VGA MONITORS

AST VISION 4N 14" 369.91
MAG INNOVISION MX15F 517.15
MAG INNOVISION MX17F 885.50
MAG INNOVISION MX17FG 949.53
MAGNAVOX CM2079 14" .28 ..... 215.20
MAGNAVOX CM2089 14" .28 ..... 268.90
MAGNAVOX CM2089 14" .28 NI 299.88
MAGNAVOX CM9217 17" 599.50
MAGNAVOX 20CM64 20" 1169.88
NANAO F340IW 15" 719.83
NANAO F550I 17" 1047.77
NANAO F550IW 17" 1199.00
NEC 3V 15" 499.82
NEC 3FGE 15" 577.17
NEC 4FGE 17" 722.72
NEC 5FGE 17" 1089.27
NEC 5FGp 17" 1357.21
NEC 6FGp 21" 2368.94
PANASONIC C1381I 14" 335.78
PHILIPS 1764DC 17" 719.50
PHILIPS BRILLIANCE 17" 1139.40
PHILIPS BRILLIANCE 21" 2449.86
SONY CPD1430 14" 579.50
SONY CPD1730 17" 1049.15
SONY 175E 17" 1199.48

VGA & SUPER VGA DISPLAY CARDS

ACTIX ULTRA PLUS 1MB 235.90
ACTIX ULTRA PLUS 2MB 304.85
ADS VGA TO TV ELITE 228.73
ATI GRAPHICS ULTRA+ 2MB 237.58
ATI GRAPHICS ULTRA PRO 2MB 357.56
ATI GRAPHICS ULTRA PRO 2MB EISA 394.92
ATI VGA WONDER XL24 ..... 119.32
CARDINAL WARPSPEED 2MB VLB 487.21
CREATIVE LABS VIDEO BLASTER 339.02
CREATIVE LABS VIDEO SPIGOT 257.63
DIAMOND STEALTH PRO 1MB 249.83
DIAMOND STEALTH PRO 2MB 336.61
DIAMOND SPEEDSTAR PRO 1MB 187.43
DIAMOND VIPER VLB 2MB 397.86
HERCULES GRAPHITE 1MB 226.46
HERCULES GRAPHITE 2MB 368.45
HERCULES DYNAMITE VLB 157.30
INTEL SMART VIDEO RECORDER 486.88
ORCHID FAHRENHEIT 1280+ 157.84
ORCHID FAHRENHEIT VA 172.97
ORCHID CELSIUS VLB 1MB 238.97
ORCHID CELSIUS VLB 2MB 299.79

If You Find a Better Price, Call CDW Before You Buy (800) 337-4CDW

NASDAQ

BUY WITH CONFIDENCE
CDW® IS A NASDAQ TRADED COMPANY
TICKER SYMBOL CDWC
D & B Rated 4A1
Duns 10-782-7982

No Surcharge For Credit Cards

CDW® HOURS

Sales 7:30-8:00 CDT Mon-Fri, 9:00-6:00 CDT Sat.

Tech Support for Customers 8:30-7:00 CDT Mon-Fri, 9:00-6:00 CDT Sat.

MOST ORDERS SHIP THE SAME DAY

FOR QUICKER RESPONSE
FAX TO
(609) 829-0692

Free Product Information

NO POSTAGE NECESSARY IF MAILED IN THE UNITED STATES

BUSINESS REPLY MAIL

FIRST CLASS MAIL PERMIT NO. 433 RIVERTON, NJ

POSTAGE WILL BE PAID BY ADDRESSEE

PC MAGAZINE

P.O. Box 1687
RIVERTON, NJ 08077-9687

PC MAGAZINE **READER SERVICE CARD FREE INFORMATION**

IT'S AS EASY AS 1, 2, 3

1. Fill in your name and address and check off your answers to the nine research questions
2. Circle the numbers on the card that correspond to the ads or articles you'd like more information about
3. The literature will be mailed to you from the advertiser free of charge

CIRCLE FOR FREE INFORMATION

Void after July 31, 1994

001 002 003 004 005 006 007 008 009 010 011 012 013 014 015 016 017 018 019 020 021 022 023 024 025 026 027 028 029 030 031 032 033 034 035 036 037 038 039 040 041 042 043 044 045 046 047 048 049 050
051 052 053 054 055 056 057 058 059 060 061 062 063 064 065 066 067 068 069 070 071 072 073 074 075 076 077 078 079 080 081 082 083 084 085 086 087 088 089 090 091 092 093 094 095 096 097 098 099 100
101 102 103 104 105 106 107 108 109 110 111 112 113 114 115 116 117 118 119 120 121 122 123 124 125 126 127 128 129 130 131 132 133 134 135 136 137 138 139 140 141 142 143 144 145 146 147 148 149 150
151 152 153 154 155 156 157 158 159 160 161 162 163 164 165 166 167 168 169 170 171 172 173 174 175 176 177 178 179 180 181 182 183 184 185 186 187 188 189 190 191 192 193 194 195 196 197 198 199 200
201 202 203 204 205 206 207 208 209 210 211 212 213 214 215 216 217 218 219 220 221 222 223 224 225 226 227 228 229 230 231 232 233 234 235 236 237 238 239 240 241 242 243 244 245 246 247 248 249 250
251 252 253 254 255 256 257 258 259 260 261 262 263 264 265 266 267 268 269 270 271 272 273 274 275 276 277 278 279 280 281 282 283 284 285 286 287 288 289 290 291 292 293 294 295 296 297 298 299 300
301 302 303 304 305 306 307 308 309 310 311 312 313 314 315 316 317 318 319 320 321 322 323 324 325 326 327 328 329 330 331 332 333 334 335 336 337 338 339 340 341 342 343 344 345 346 347 348 349 350
351 352 353 354 355 356 357 358 359 360 361 362 363 364 365 366 367 368 369 370 371 372 373 374 375 376 377 378 379 380 381 382 383 384 385 386 387 388 389 390 391 392 393 394 395 396 397 398 399 400
401 402 403 404 405 406 407 408 409 410 411 412 413 414 415 416 417 418 419 420 421 422 423 424 425 426 427 428 429 430 431 432 433 434 435 436 437 438 439 440 441 442 443 444 445 446 447 448 449 450
451 452 453 454 455 456 457 458 459 460 461 462 463 464 465 466 467 468 469 470 471 472 473 474 475 476 477 478 479 480 481 482 483 484 485 486 487 488 489 490 491 492 493 494 495 496 497 498 499 500
501 502 503 504 505 506 507 508 509 510 511 512 513 514 515 516 517 518 519 520 521 522 523 524 525 526 527 528 529 530 531 532 533 534 535 536 537 538 539 540 541 542 543 544 545 546 547 548 549 550
551 552 553 554 555 556 557 558 559 560 561 562 563 564 565 566 567 568 569 570 571 572 573 574 575 576 577 578 579 580 581 582 583 584 585 586 587 588 589 590 591 592 593 594 595 596 597 598 599 600
601 602 603 604 605 606 607 608 609 610 611 612 613 614 615 616 617 618 619 620 621 622 623 624 625 626 627 628 629 630 631 632 633 634 635 636 637 638 639 640 641 642 643 644 645 646 647 648 649 650
651 652 653 654 655 656 657 658 659 660 661 662 663 664 665 666 667 668 669 670 671 672 673 674 675 676 677 678 679 680 681 682 683 684 685 686 687 688 689 690 691 692 693 694 695 696 697 698 699 700
701 702 703 704 705 706 707 708 709 710 711 712 713 714 715 716 717 718 719 720 721 722 723 724 725 726 727 728 729 730 731 732 733 734 735 736 737 738 739 740 741 742 743 744 745 746 747 748 749 750
751 752 753 754 755 756 757 758 759 760 761 762 763 764 765 766 767 768 769 770 771 772 773 774 775 776 777 778 779 780 781 782 783 784 785 786 787 788 789 790 791 792 793 794 795 796 797 798 799 800
801 802 803 804 805 806 807 808 709 810 811 812 813 814 815 816 817 818 819 820 821 822 823 824 825 826 827 828 829 830 831 832 833 834 835 836 837 838 839 840 841 842 843 844 845 846 847 848 849 850
851 852 853 854 855 856 857 858 859 860 861 862 863 864 865 866 867 868 869 870 871 872 873 874 875 876 877 878 879 880 881 882 883 884 885 886 887 888 889 890 891 892 893 894 895 896 897 898 899 900
901 902 903 904 905 906 907 908 909 910 911 912 913 914 915 916 917 918 919 920 921 922 923 924 925 926 927 928 929 930 931 932 933 934 935 936 937 938 939 940 941 942 943 944 945 946 947 948 949 950
951 952 953 954 955 956 957 958 959 960 961 962 963 964 965 966 967 968 969 970 971 972 973 974 975 976 977 978 979 980 981 982 983 984 985 986 987 988 989 990 991 992 993 994 995 996 997 998 999

1. Do you work in a DP/MIS dept.?
01. ☐ Yes 02. ☐ No

2. Please indicate your company or organization's primary business activity: (Check one)
01. ☐ Manufacturer Computer Equip., Computers, Software
02. ☐ Manufacturer–Aerospace
03. ☐ Manufacturer–Other
04. ☐ Systems House
05. ☐ Computer Consultant
06. ☐ Computer Retaler/VAR/VAD Distributor
07. ☐ Communications
08. ☐ Finance/Banking/Insurance/ Real Estate/Accounting
09. ☐ Education
10. ☐ Government
12. ☐ Research and Development
13. ☐ Data Processing/Computer Service
14 ☐ Health/Medical/Legal Service
15. ☐ Engineering/Architecture
16. ☐ Agr./Const./Mining/Oil/ Transp./Utilities
17. ☐ Non-Computer Retaler/Dist.
18. ☐ Other Business or Service

3. Please indicate your primary business function: (Check one)
01. ☐ DP/MIS
02. ☐ Systems, Programming
03. ☐ Communications
04. ☐ Engineering
05. ☐ Res./Dev./Scientific
06. ☐ Accounting/Finance
07. ☐ Computer Consulting
08. ☐ Purchasing
09 ☐ Operations
10 ☐ Production
11 ☐ Education/Training
12 ☐ Marketing/Sales
13. ☐ Medical/Legal
14 ☐ Admin./Mgmt.

4. Is your company a reseller?
01 ☐ Yes 02 ☐ No

5. For how many IBM PCs and compatibles do you specify brands of products:
01. ☐ 10 or less 03. ☐ 26-99
02 ☐ 11-25 04 ☐ 100 or more

6. Are there any PCs in your office?
01 ☐ Linked to mainframe
02 ☐ Linked to mini
03 ☐ Networked together

7. Please check the equipment currently installed at your location: (Check all that apply)
01. ☐ IBM or Compatible PCs
02. ☐ IBM or Compatible Mainframes
03. ☐ IBM or Compatible Minis
04 ☐ Macintosh
05 ☐ CD-ROM
06 ☐ Windows

8. Do you plan to buy any PC products?
01 ☐ Now 03. ☐ In 7 to 12 months
02 ☐ In 4 to 6 months 04. ☐ No definite plans

9. Number of employees in your entire company:
01 ☐ 25 or less 03 ☐ 100-499 05 ☐ 1000 or more
02 ☐ 26-99 04 ☐ 500-999

Name PC 3/15-6

Title Telephone

Company Name

Address

City State Zip

☐ Please send me a one-year (22-issue) subscription to PC Magazine for $29.97 (U.S. price); all other countries add $36.00 for additional postage

In a Hurry? Fax This Card To 609-829-0692

PC MAGAZINE

READER SERVICE CARD FREE INFORMATION

IT'S AS EASY AS 1, 2, 3

1. Fill in your name and address and check off your answers to the nine research questions.
2. Circle the numbers on the card that correspond to the ads or articles you'd like more information about.
3. The literature will be mailed to you from the advertiser free of charge.

CIRCLE FOR FREE INFORMATION

Void after July 31, 1994

001 002 003 004 005 006 007 008 009 010 011 012 013 014 015 016 017 018 019 020 021 022 023 024 025 026 027 028 029 030 031 032 033 034 035 036 037 038 039 040 041 042 043 044 045 046 047 048 049 050
051 052 053 054 055 056 057 058 059 060 061 062 063 064 065 066 067 068 069 070 071 072 073 074 075 076 077 078 079 080 081 082 083 084 085 086 087 088 089 090 091 092 093 094 095 096 097 098 099 100
101 102 103 104 105 106 107 108 109 110 111 112 113 114 115 116 117 118 119 120 121 122 123 124 125 126 127 128 129 130 131 132 133 134 135 136 137 138 139 140 141 142 143 144 145 146 147 148 149 150
151 152 153 154 155 156 157 158 159 160 161 162 163 164 165 166 167 168 169 170 171 172 173 174 175 176 177 178 179 180 181 182 183 184 185 186 187 188 189 190 191 192 193 194 195 196 197 198 199 200
201 202 203 204 205 206 207 208 209 210 211 212 213 214 215 216 217 218 219 220 221 222 223 224 225 226 227 228 229 230 231 232 233 234 235 236 237 238 239 240 241 242 243 244 245 246 247 248 249 250
251 252 253 254 255 256 257 258 259 260 261 262 263 264 265 266 267 268 269 270 271 272 273 274 275 276 277 278 279 280 281 282 283 284 285 286 287 288 289 290 291 292 293 294 295 296 297 298 299 300
301 302 303 304 305 306 307 308 309 310 311 312 313 314 315 316 317 318 319 320 321 322 323 324 325 326 327 328 329 330 331 332 333 334 335 336 337 338 339 340 341 342 343 344 345 346 347 348 349 350
351 352 353 354 355 356 357 358 359 360 361 362 363 364 365 366 367 368 369 370 371 372 373 374 375 376 377 378 379 380 381 382 383 384 385 386 387 388 389 390 391 392 393 394 395 396 397 398 399 400
401 402 403 404 405 406 407 408 409 410 411 412 413 414 415 416 417 418 419 420 421 422 423 424 425 426 427 428 429 430 431 432 433 434 435 436 437 438 439 440 441 442 443 444 445 446 447 448 449 450
451 452 453 454 455 456 457 458 459 460 461 462 463 464 465 466 467 468 469 470 471 472 473 474 475 476 477 478 479 480 481 482 483 484 485 486 487 488 489 490 491 492 493 494 495 496 497 498 499 500
501 502 503 504 505 506 507 508 509 510 511 512 513 514 515 516 517 518 519 520 521 522 523 524 525 526 527 528 529 530 531 532 533 534 535 536 537 538 539 540 541 542 543 544 545 546 547 548 549 550
551 552 553 554 555 556 557 558 559 560 561 562 563 564 565 566 567 568 569 570 571 572 573 574 575 576 577 578 579 580 581 582 583 584 585 586 587 588 589 590 591 592 593 594 595 596 597 598 599 600
601 602 603 604 605 606 607 608 609 610 611 612 613 614 615 616 617 618 619 620 621 622 623 624 625 626 627 628 629 630 631 632 633 634 635 636 637 638 639 640 641 642 643 644 645 646 647 648 649 650
651 652 653 654 655 656 657 658 659 660 661 662 663 664 665 666 667 668 669 670 671 672 673 674 675 676 677 678 679 680 681 682 683 684 685 686 687 688 689 690 691 692 693 694 695 696 697 698 699 700
701 702 703 704 705 706 707 708 709 710 711 712 713 714 715 716 717 718 719 720 721 722 723 724 725 726 727 728 729 730 731 732 733 734 735 736 737 738 739 740 741 742 743 744 745 746 747 748 749 750
751 752 753 754 755 756 757 758 759 760 761 762 763 764 765 766 767 768 769 770 771 772 773 774 775 776 777 778 779 780 781 782 783 784 785 786 787 788 789 790 791 792 793 794 795 796 797 798 799 800
801 802 803 804 805 806 807 808 709 810 811 812 813 814 815 816 817 818 819 820 821 822 823 824 825 826 827 828 829 830 831 832 833 834 835 836 837 838 839 840 841 842 843 844 845 846 847 848 849 850
851 852 853 854 855 856 857 858 859 860 861 862 863 864 865 866 867 868 869 870 871 872 873 874 875 876 877 878 879 880 881 882 883 884 885 886 887 888 889 890 891 892 893 894 895 896 897 898 899 900
901 902 903 904 905 906 907 908 909 910 911 912 913 914 915 916 917 918 919 920 921 922 923 924 925 926 927 928 929 930 931 932 933 934 935 936 937 938 939 940 941 942 943 944 945 946 947 948 949 950
951 952 953 954 955 956 957 958 959 960 961 962 963 964 965 966 967 968 969 970 971 972 973 974 975 976 977 978 979 980 981 982 983 984 985 986 987 988 989 990 991 992 993 994 995 996 997 998 999

1. Do you work in a DP/MIS dept.?
01. ☐ Yes 02. ☐ No

2. Please indicate your company or organization's primary business activity: (Check one)
01. ☐ Manufacturer Computer Equip., Computers, Software
02. ☐ Manufacturer–Aerospace
03. ☐ Manufacturer–Other
04. ☐ Systems House
05. ☐ Computer Consultant
06. ☐ Computer Retailer/VAR/VAD Distributor
07. ☐ Communications
08. ☐ Finance/Banking/Insurance/Real Estate/Accounting
09. ☐ Education
10. ☐ Government
12. ☐ Research and Development
13. ☐ Data Processing/Computer Service
14. ☐ Health/Medical/Legal Service
15. ☐ Engineering/Architecture
16. ☐ Agr./Const./Mining/Oil/Transp./Utilities
17. ☐ Non-Computer Retailer/Dist.
18. ☐ Other Business or Service

3. Please indicate your primary business function: (Check one)
01. ☐ DP/MIS
02. ☐ Systems, Programming
03. ☐ Communications
04. ☐ Engineering
05. ☐ Res./Dev./Scientific
06. ☐ Accounting/Finance
07. ☐ Computer Consulting
08. ☐ Purchasing
09. ☐ Operations
10. ☐ Production
11. ☐ Education/Training
12. ☐ Marketing/Sales
13. ☐ Medical/Legal
14. ☐ Admin./Mgmt.

4. Is your company a reseller?
01. ☐ Yes 02. ☐ No

5. For how many IBM PCs and compatibles do you specify brands of products:
01. ☐ 10 or less 03. ☐ 26-99
02. ☐ 11-25 04. ☐ 100 or more

6. Are there any PCs in your office?
01. ☐ Linked to mainframe
02. ☐ Linked to [illegible]
03. ☐ Networked together

7. Please check the equipment currently installed at your location: (Check all that apply)
01. ☐ IBM or Compatible PCs
02. ☐ IBM or Compatible Mainframes
03. ☐ IBM or Compatible Minis
04. ☐ Macintosh
05. ☐ CD-ROM
06. ☐ Windows

8. Do you plan to buy any PC products?
01. ☐ Now 03. ☐ In 7 to 12 months
02. ☐ In 4 to 6 months 04. ☐ No definite plans

9. Number of employees in your entire company:
01. ☐ 25 or less 03. ☐ 100-499 05. ☐ 1000 or more
02. ☐ 26-99 04. ☐ 500-999

Name

PC 3/15-6

Title

Telephone

Company Name

Address

City State Zip

☐ Please send me a one-year (22-issue) subscription to PC Magazine for $29.97 (U.S. price); all other countries add $36.00 for additional postage.

In a Hurry? Fax This Card To 609-829-0692

FOR QUICKER RESPONSE FAX TO (609) 829-0692

Free Product Information

NO POSTAGE NECESSARY IF MAILED IN THE UNITED STATES

BUSINESS REPLY MAIL

FIRST CLASS MAIL PERMIT NO. 433 RIVERTON, NJ

POSTAGE WILL BE PAID BY ADDRESSEE

PC MAGAZINE

P.O. Box 1687
RIVERTON, NJ 08077-9687

COMPUTER DISCOUNT WAREHOUSE™

CDW

Megahertz
Leading Your World

CDW TOP SELLER

Megahertz 14.4K PCMCIA Fax/Modem with XJACK™

- XJACK lightens your load; no longer have to carry around awkward external connectors
- XJACK pops in and out of the notebook with the touch of a finger
- Cellular-ready, frees you from telephone lines
- Polycarbonate resin construction makes it indestructable

ONLY ..... $309.31 CDW 27680

WHY SETTLE FOR LESS?

CDW® SERVICES YOU BETTER

NEC

MultiSync 5FGe 17" Flat Square Technology Monitor

- Digital Controls
- AccuColor System
- Energy Star Certified
- Max Res 1024 x 768

FREE COREL DRAW V3.0*

*Call for details through 3/15/94

ONLY ..... $1089.27 CDW 33297

CDW CARRIES OVER 15,000 PRODUCTS. IF YOU DON'T SEE IT, CALL!

COMPUTERS

TOSHIBA

T1950/120MB	1877.19	T4600/200MB	2299.00
T1950CS/120MB	2477.17	T4600C/120MB	[illegible]
T1950CT 120MB	2799.00	T4600C/200MB	[illegible]
T1950/200MB	2097.00	T4600C/340MB	[illegible]
T1950CS/200MB PAS CLR			2697.82
T1950CT 200MB ACT CLR			2999.00
T1950CT 320MB ACT CLR			3399.00
T3400/120MB			2197.00
T3400CT 120MB ACT CLR			3448.00
T4600/120MB			1999.00
T4700CS/200MB PAS CLR			3897.00
T4700CT 200MB ACT CLR			4499.00
T4700CS/320MB PAS CLR			4297.00
T4700CT 320MB ACT CLR			4849.00
T6600C/510MB			8099.00
T6600C/510MB CD			9599.00
T6600C/510MB CD/DVI			7599.00

AST

BRAVO NOTEBOOKS

LC 4/25S 120MB	1897.36	LP 4/25S 340MB	[illegible]
LC 4/33S 120MB	1979.00	LP 4/33D 170MB	[illegible]
LC 4/33D 120MB	1257.27	LP 4/33D 340MB	[illegible]
LC 4/33D 210MB	1497.97	LP 4/66D 170MB	[illegible]
LC 4/50D 120MB	1498.86	LP 4/66D 340MB	[illegible]
LC 4/50D 210MB	1697.39	MT 4/33D 170MB	[illegible]
LC 4/66D 120MB	1749.54	MT 4/33D 340MB	[illegible]
LC 4/66D 210MB	1998.86	MT 4/66D 170MB	[illegible]
LP 4/25S 170MB	1163.86	MT 4/66D 340MB	[illegible]
NOTEBOOK 80MB MONO			1606.15
NOTEBOOK 120MB MONO			1719.70
NOTEBOOK 120MB COLOR			2227.36
NOTEBOOK 170MB MONO			1799.45
NOTEBOOK 170MB COLOR			2437.20
NOTEBOOK 170MB COLOR+			3157.36

Canon

NOTEJET 4/25 135MB	2997.97
NOTEJET 4/25 180MB	3091.74
INNOVA 4/33L SX 170MB	1833.98
INNOVA 4/33L SX 240MB	1928.71
INNOVA 4/50L 170MB	1365.86
INNOVA 4/50L 240MB	1432.96
INNOVA 4/66L 170MB	1536.57
INNOVA 4/66L 240MB	1614.80

NEC

VERSA NOTEBOOKS

4/40 120MB MONO	2813.31
4/40 120MB COLOR	3878.60
4/40 250MB MONO	3037.39
4/40 250MB COLOR	4279.51
4/50 209MB MONO	3299.82
4/50 209MB COLOR	4549.26
4/50 340MB MONO	3719.11
4/50 340MB COLOR	4969.31
READY ES 4/25 170MB	997.52
READY ES 4/33S 210MB	1246.68
READY ES 4/66 250MB	1894.83
READY 4/25S 170MB Multimedia	1447.16
READY 4/33S 210MB Multimedia	1879.89
POWERMATE ES 4/25 170MB	1069.79

SHARP

SHARP 486/33 200MB PAS CLR	2999.97
SHARP 486/33 200MB ACT CLR	3999.79

Texas Instruments

TM4000E 4/25D 120MB MONO	1859.55
TM4000 4/25D 200MB MONO	2249.44
TM4000E 4/25S 120MB ADV COLOR	2098.43
TM4000E 4/40 200MB ADV PAS CLR	2768.44
TM4000E 4/50 200MB MONO	2696.06
TM4000E 4/50 200MB DUAL COLOR	3218.00
TM4000E 4/50 200MB ACT COLOR	3779.16

DOT MATRIX & LASER PRINTERS

OKIDATA

184 TURBO	218.14	ML590	488.61
ML320	284.48	ML591	586.87
ML321	433.43	PACEMARK 3410	1223.00
ML380	214.86	OL400E	488.86
ML395	586.39	OL810	805.86
ML395C	1030.74	OL830+	1079.11
ML520	388.83	OL850	1186.39
ML521	486.18	DOC-IT 4000	2999.49

Canon

BJ10SX	288.86
BJ200E NEW	388.34
BJ230	388.86
BJC600 COLOR	688.86
LBP430 LASER	886.86

DOT MATRIX & LASER PRINTERS

EPSON

AP2250	115.63	LQ570+	237.97
AP3250	172.86	LQ1070+	365.35
AP3260	199.16	LQ870	444.91
LX810	167.80	LQ1170	611.93
FX870	287.89	LQ2550	896.08
FX1170	356.86	DFX5000	1319.84
STYLUS 300	229.86	DFX8000	2269.45
STYLUS 800			377.97
ACTION LASER 1500			848.97
ACTION LASER 1500 W/2MB			716.32

NEC

P3200	225.78	Silentwriter 95F	867.70
SuperScript 610	585.78	Silentwriter 95FX	1095.95
Silentwriter 640	788.54	Silentwriter 1097	1377.80

Panasonic

1150	123.49	2180	198.31
1624	366.39	2624	488.86
1695	388.44	4410 LASER	888.15
2023	302.97	4430 LASER	699.86
2123	343.37	4440 LASER	1238.00
2124	318.41		

Texas Instruments

MICROMARC INKJET	277.97
MICROWRITER BASIC	517.10
MICROWRITER PS35	677.32
MICROWRITER PS55	897.39
MICROLASER PRO 600 PS23*	1316.32
MICROLASER PRO 600 PS55	1636.35
POWERSTEP UPG- mL600	312.86

After $50 Manufacturer rebate. Expires 3/31/94

HEWLETT PACKARD

DeskJet Portable 310	387.40	LaserJet 4L	899.97
HP DeskJet 500	299.09	LaserJet 4P	999.92
HP DeskJet 500C	399.50	LaserJet 4M+	1499.88
HP DeskJet 550C	598.12	LaserJet 4	1498.58
HP DeskJet 1200C	1459.61	LaserJet 4M	1965.64
HP DeskJet 1200C PS	1998.47	LaserJet 4Si	2998.95
HP Paintjet XL300	729.93	LaserJet 4Si MX	4508.36

SHARP

SHARP JX9400 300DPI 4PPM	499.97
SHARP JX9460 600DPI 6PPM	949.86

IBM LEXMARK

4037 5E 5PPM	657.17
4029-10 10PPM	1127.48
4039-10R 10PPM	1337.46
4039-10RD 10PPM DUPLEX	1837.77
4039-12R 12PPM	1687.76
4039-12L 12PPM	2397.66

HARD DRIVES & CONTROLLERS

Maxtor

7131A 131MB IDE	199.10	7345A 345MB IDE	388.16
7245A 245MB IDE	338.87	7345S 345MB SCSI	388.86
7245S 245MB SCSI	394.44	7545A 540MB IDE	497.87

MICROPOLIS

1050MB IDE	849.39	1.7GB SCSI	1979.39
1050MB SCSI	949.31	1.080GB SCSI AV	999.36

CONNER

210MB IDE	288.86	540MB IDE	536.39
343MB IDE	388.87	540MB SCSI	649.39
343MB SCSI	349.92	1GB SCSI	977.21
426MB IDE	419.86	1.37GB SCSI	1999.89

Seagate

ST3243A 200MB IDE	225.75
ST3290A 261MB IDE	255.56
ST3396A 341MB IDE	318.00
ST3550A 452MB IDE	448.54
ST11200N 1.05GB SCSI	969.33

CONTROLLERS

ACCULOGIC IDE	23.65
ACCULOGIC IDE W/1PAR, 2SER, 1GAME	35.06
ACCULOGIC IDE W/BIOS	48.90
ACCULOGIC VLB IDE	38.76
ACCULOGIC ISA SCSI-2	125.44
ACCULOGIC EISA SCSI-2	358.88
ADAPTEC 1542CF SCSI KIT	265.45

MODEMS & COMMUNICATIONS

US Robotics

SPORTSTER MODEMS

14.4 INT			139.86
14.4 INT W/FAX			149.86
14.4 EXT			159.80
14.4 EXT W/FAX			169.80
WORLDPORT 14.4			149.86

COURIER MODEMS

V.32TERBO INT			323.86
V.32TERBO INT W/FAX			369.44
V.32TERBO EXT			379.33
V.32TERBO EXT W/FAX			429.86
DUAL STD INT W/FAX			462.86
DUAL STD TERBO INT W/FAX			479.91
DUAL STD TERBO EXT W/FAX			529.86

Hayes

Acc 2400B INT	98.10	Opt 96 + FAX 96 EXT	354.42
Acc 2400 EXT	89.25	Opt 14.4 EXT	363.80
Acc 24EC + FAX 96 INT	85.49	Opt 14.4 + FAX 14.4 EXT	378.30
Acc 96 + FAX 96 INT	175.12	Opt 14.4 + FAX 14.4 Pocket	288.93
Acc 96 + FAX 96 EXT	189.88	Opt 28.8K V.FC FAX 14.4 INT	199.89
Acc 14.4 + FAX 14.4 INT	199.89	Opt 28.8K V.FC EXT W/FAX	438.13
Acc 14.4 + FAX 14.4 EXT	219.46	Ultra 9600 EXT	588.18
Opt 2400 V.42BIS EXT	112.84	Ultra 14.4 EXT	534.56
Opt 24 + FAX 96 EXT	119.34	ESP Accelerator Single	
Opt 9600 EXT	338.50	Dual Serial	79.90/116.94

Zoom

2400B INT			61.86
2400 EXT			86.86
PM2400EFX 2400 V.42 INT W/FAX			89.86
PM2400EF 2400 V.42 EXT W/FAX			109.86
PM2400FP 2400 POCKET W/FAX			109.86
PM9600FX 9600 INT W/FAX			199.77
PM9600FXMT 9600 EXT W/FAX			199.86
PM14400FX 14.4 INT W/FAX			169.80
PM14400FXMT 14.4 EXT W/FAX			179.86
PM14400FXSA 14.4 EXT W/FAX, LCD			374.46

Intel

SATISFAXTION MODEMS

100 INT	98.66	350 INT	257.22
200 INT	209.50	400 INT	273.06
300 INT	229.70	400 EXT	308.59

FAX MODEMS

9600 V.42BIS Int.	199.70	9600 EXT W/Fax	165.26
2400 V.42BIS Ext	112.52	14.4 INT W/Fax	168.45
9600 INT W/Fax	133.76	14.4 EXT W/Fax	197.39

BOCA

BOCA 14.4K INT W/FAX	119.55
BOCA 14.4K EXT W/FAX	149.85

BATTERY BACKUP AND UPS

Tripp Lite

BC250	99.11	BC900 LAN	399.97
BC400	139.77	BC1250 LAN	449.89
BC500	191.42	OMNI 500 LAN	396.91
BC500 LAN	199.40	OMNI 600 LAN	399.89
BC600 LAN	239.50	OMNI 750 LAN	399.86
BC750 LAN	313.90	OMNI 1250 LAN	699.05
OMNI 1600 LAN			777.13
LAP POWER AC/DC INVERTER			59.23
POWERMISER 4 OUTLET			49.50
ISOBAR 4 OUTLET			38.95
ISOBAR 6 OUTLET			46.38

APC

BACK UPS 250	99.34	SMART UPS 400	299.95
BACK UPS 400	159.83	SMART UPS 600	363.39
BACK UPS 450	199.81	SMART UPS 900	579.55
BACK UPS 600	264.84	SMART UPS 1250	729.87
BACK UPS 900	374.14		
BACK UPS 1250	498.77		
SURGEARREST PLUS			29.97
SURGEARREST PLUS W/TEL			34.88
LINE-R 600			119.09

Logitech

LOGITECH DEXXA SERIAL MOUSE	27.37
LOGITECH MOUSEMAN COMBO	86.85
LOGITECH MOUSEMAN CORDLESS	89.93
LOGITECH TRACKMAN PORTABLE	72.50
LOG FOTOMAN+ W/FREE MOUSE	549.76
MICROSOFT MOUSE V2.0 SERIAL*	59.00
MICROSOFT MOUSE V2.0 PS/2*	59.00
MICROSOFT BALLPOINT V2.0	146.39

* WHILE SUPPLIES LAST

PCMCIA

DATARACE PCMCIA 2400 W/FAX	[illegible]
DATARACE PCMCIA 14.4K W/FAX	[illegible]
DLINK PCMCIA ETHERNET 10BT	[illegible]
HAYES PCMCIA OPTIMA 9600 W/FAX	[illegible]
HAYES PCMCIA OPTIMA 14.4 W/FAX	[illegible]
IBM PCMCIA TOKEN RING 16/4	[illegible]
INTEL PCMCIA 2400 W/FAX	[illegible]
INTEL PCMCIA 9600 W/FAX	[illegible]
INTEL PCMCIA 14.4 W/FAX	[illegible]
LINKSYS PCMCIA ETHERNET COAX	[illegible]
LINKSYS PCMCIA ETHERNET 10BT	[illegible]
MEGAHERTZ PCMCIA 2400 W/FAX	[illegible]
MEGAHERTZ PCMCIA 2400 XJACK W/FAX	[illegible]
MEGAHERTZ PCMCIA 9600 W/FAX	[illegible]
MEGAHERTZ PCMCIA 9600 XJACK W/FAX	[illegible]
MEGAHERTZ PCMCIA 14.4 W/FAX	[illegible]
MEGAHERTZ PCMCIA 14.4 XJACK W/FAX	[illegible]
NOVELL/EAGLE PCMCIA ETHERNET COAX	[illegible]
PRACTICAL PCMCIA 14.4 W/FAX	[illegible]
T. CONRAD PCMCIA ETHERNET COAX	[illegible]
USR WORLDPORT PCMCIA 2400 W/FAX	[illegible]
USR WORLDPORT PCMCIA 14.4 W/FAX	[illegible]
XIRCOM PCMCIA ETHERNET COAX	[illegible]
XIRCOM PCMCIA ETHERNET 10BT	[illegible]
XIRCOM PCMCIA ETHERNET COMBO	[illegible]

CD-ROM & OPTICAL DRIVES

CHINON CDS535 INT CD-ROM KIT	385.60
CHINON CDX535 EXT CDROM KIT	455.88
ACCULOGIC PAR PORT CD-ROM	499.50
HITACHI 1900S EXT CD-ROM	499.85
HITACHI CDR1950 EXT	539.84
HITACHI 6700 INT CD-ROM	409.85
HITACHI CDR6750 INT	417.78
NEC 3XI INTERNAL	479.90
NEC 3XE EXTERNAL	558.92
NEC 3Xp PORTABLE	427.59
ORCHID CDS3110 INT	229.63
PIONEER DRM604X 6 DISC QUADRASPIN	1149.00
PROCOM 200MS INT SCSI CD-ROM	452.09
PROCOM 200MS EXT SCSI CD-ROM	557.85
SONY CDU535 INT CD-ROM	265.72
SONY CDU54101 INT SCSI CD-ROM	349.15
SONY CDU7205N EXT CD-ROM	463.19
SYTOS PARALLEL PORT CD-ROM	299.51
TEXEL 3028 240MS INT KIT	CALL
TEXEL 3028 W/PA SPECTRUM 16	CALL
TEXEL 5028 240MS EXT KIT	CALL
TEXEL 5028 W/PA SPECTRUM 16	CALL
TOSHIBA 3401 INT SCSI CD-ROM	389.60
TOSHIBA 3401 INT SCSI CD-ROM W/Adpt	535.14
TOSHIBA 3401 EXT SCSI CD-ROM	489.61
TOSHIBA 3401 EXT SCSI CD-ROM W/Adpt	649.55
TOSHIBA 3401 EXT SCSI 4 Drive Tower	2535.08

VIDEO PRODUCTS

VGA & SVGA MONITORS

ACER SVGA 14"	[illegible]
AST VISION 4N 14"	[illegible]
AST VISION 4L 14"	[illegible]
IBM SVGA 14"	[illegible]
IBM 17P 1"	[illegible]
MAG INNOVISION LX1564 15"	[illegible]
MAG INNOVISION MX15F 15"	[illegible]
MAG INNOVISION MX17F 17"	[illegible]
MAG INNOVISION MXP21F 21"	[illegible]
MAGNAVOX [illegible] 14" 39	[illegible]
MAGNAVOX [illegible] 14" 28	[illegible]
MAGNAVOX CRD099 14" 28 NI	[illegible]
MAGNAVOX CM2217 17"	[illegible]
MAGANAVOX 20CM64 20"	[illegible]
NANAO F340IW 15"	[illegible]
NANAO F450IW 17"	[illegible]
NANAO F550IW 17"	[illegible]
NEC 3V 15"	[illegible]
NEC 3FGE 15"	[illegible]
NEC 4FGE 17"	[illegible]
NEC 5FGE 17"	[illegible]
NEC 5FGp 17"	[illegible]
NEC 6FGp 21"	[illegible]
PANASONIC C1381i 14"	[illegible]
PHILIPS 7564DC 17"	[illegible]
SONY CPD1430 14"	[illegible]
SONY CPD1730 17"	[illegible]
SONY 17SE 17"	[illegible]

VGA & SVGA DISPLAY CARDS

ACTIX ULTRA PLUS 1MB	[illegible]
ACTIX ULTRA PLUS 2MB	[illegible]
ADS VGA TO TV ELITE	[illegible]
ATI GRAPHICS ULTRA+ 2MB	[illegible]
ATI GRAPHICS ULTRA PRO 2MB	[illegible]
ATI GRAPHICS ULTRA PRO 2MB EISA	[illegible]
ATI VGA WONDER XL24	[illegible]
CARDINAL SVGA SPEED 2MB VLB	[illegible]
CREATIVE LABS VIDEO BLASTER	[illegible]
CREATIVE LABS VIDEO SPIGOT	[illegible]
DIAMOND STEALTH PRO 1MB	[illegible]
DIAMOND STEALTH PRO 2MB	[illegible]
DIAMOND SPEEDSTAR PRO 1MB	[illegible]
DIAMOND VIPER VLB 2MB	[illegible]
HERCULES GRAPHITE 1MB	[illegible]
HERCULES GRAPHITE 2MB	[illegible]
INTEL SMART VIDEO RECORDER	[illegible]
ORCHID FAHRENHEIT 1280+	[illegible]
ORCHID FAHRENHEIT VA	[illegible]
ORCHID CELSIUS VLB 1MB	[illegible]
ORCHID CELSIUS VLB 2MB	[illegible]

COMPUTER DISCOUNT WAREHOUSE™

NEW! Lease Option Call for Details

CDW® Sells for Less and Services You Better!

(800) 337-4CDW

FAX (708) 291-1737

CALL FOR FREE CDW® CATALOG

©1994 CDW® Computer Centers, Inc. PCM863

COMPUTER DISCOUNT WAREHOUSE™

WHY PAY RETAIL? CDW® Sells For Less !

COMPUTER DISCOUNT

SHARP Color Notebooks

SHARP

The World's Largest Manufacturer of LCD Color Displays!

PC-8150 DUAL SCAN
PC-8650 ACTIVE MATRIX

- SL-Enhanced i486DX/33
- 4MB RAM Exp to 20MB
- 200MB Hard Drive
- 640 X 480 Color Display, 256 Colors
- Simultaneous External Video
- 1024 X 768 External Video Support
- PCMCIA Type II Card Slot
- Serial, Parallel, Ext. Video, Ext. Trackball Ports
- Nickel Metal Hydride Battery
- MS-DOS & MS Windows 3.1 Pre-Installed on Hard Drive
- Trackball

Choose From Two Brilliant Color Displays

STN Dual Scan 9.4" Color Display..... **$2698.37** CDW 34089

TFT Active Matrix 8.4" Color Display... **$2999.76** CDW 34088

US Robotics Modems

US Robotics™

SPORTSTER 14.4: Performance

CDW TOP SELLER

- Features V.42/MNP 2-4 Error Control and V.42 bis/MNP 5 Data Compression for 57,600 bps Error-Free Throughput
- Internal Modems Include DCA Crosstalk
- Delrina WinFax Lite Included with Fax Models
- Backed with a Full 5 Year Parts and Labor Warranty
- Made in the USA
- Fax Models 14.4K Fax

Internal Fax/Data	**$149.50**	28410
External Fax/Data	**$169.50**	28092
External Data Only	**$159.50**	28305
Internal Data Only	**$139.50**	28738

WORLDPORT Pocket Modems

◆ V.32bis 14.4K bps ◆ 9V Battery Powered, AC Adapter Included

14.4K Pocket ..... **$149.00** CDW 27097

Courier Upgradeable Modems

COURIER V.32terbo

The Cutting Edge of Data Communicatons Performance is Now Available from US Robotics: V.32terbo is an Emerging Protocol, Providing 19.2K bps Data Transfer RatesWithout Compression.

The Latest Technology is Available at CDW

COURIER MODEMS

Model	Data (bps) Protocol	Fax (bps)	V.42 V.42bis MNP 2-5	Type	CDW Price	CDW
V.32terbo	19.2K, V.32terbo, V.32bis	14.4K	✓	INT	$333.60	32490
				EXT	$349.23	32489
V.32terbo w/Fax	19.2K, V.32terbo, V.32bis	14.4K	✓	INT	$365.46	32492
				EXT	$399.08	32491
Dual Standard V.32terbo w/Fax	14.4K/19.2K V.32terbo HST	14.4K	✓	INT	$679.01	32779
				EXT	$716.63	32778

WORLDPORT PCMCIA MODEMS

14.4 Fax/Data	$284.60	33778
2400 Data/9600 Fax	$284.60	30224

If You Find a Better Price, Call CDW® Before You Buy!

CDW® Sells for Less and Services You Better!

(800) 337-4CDW

PCM863

©1994 CDW® Computer Centers, Inc

FREE TECHNICAL SUPPORT FOR CDW® CUSTOMERS (708) 291-7575

COMPUTER DISCOUNT WAREHOUSE™

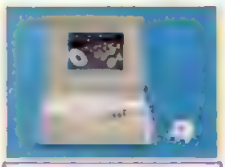
WHY PAY RETAIL? CDW® Sells For Less !

TOSHIBA Portable Computers

T1950/T1950CS/T1950CT

T4600/T4600C

T4700CS/T4700CT



T6600/T6600C/CD T6600C/CDV

T3400/T3400CT

	Model	CPU	RAM (MB) STD/MAX	Display	Expansion PCMCIA	Weight Lbs.	Hard Drive	CDW Price	CDW
1-Year Warranty	T1950	i486DX2/40	4/20	9.5" 64 Gray Scale LCD	Type III	6.6	120MB	$1877.10	31928
							200MB	$	31929
	T1950CS	i486DX2/40	4/20	9.5" Dynamic STN Color	Type III	6.9	120MB	$	31930
							200MB	$	31932
	T1950CT	i486DX2/40	4/20	8.4" Active matrix Color	Type III	6.9	120MB	$	32042
							200MB	$	32043
							320MB	$	320445
3-Year Warranty	T3400	i4865X/33	4/20	8.4" 64 Gray Scale LCD	IV Type II	4.1	120MB	$	33634
	T3400CT	i4865X/33	4/20	7.8" Active Matrix Color	IV Type II	4.4	120MB	$	33635
	T4600	i486SL/33	4/20	9.5" 64 Gray Scale LCD	IV or II	6.5	120MB	$	29539
							200MB	$	29540
	T4600C	i486SL/33	4/20	9.5" Active Matrix Color	IV or II	6.9	120MB	$	29541
							200MB	$	29542
							320MB	$	29543
	T4700CS	i486DX2/50	8/24	9.5" Dynamic STN Color	II, III	6.9	200MB	$	33645
							320MB	$	33646
	T4700CT	i486DX2/50	8/24	9.5" Active Matrix Color	II, III	6.9	200MB	$	33642
							320MB	$	33644
	T6600	i486DX2/66	8/20	10.4" Active Matrix Color	IV Type II	17.1	510MB	$	30400
	T6600C/CD	i486DX2/66	8/20	10.4" Active Matrix Color	IV Type II	18.7	510MB	$	30401
	T6600C/CDV	i486DX2/66	8/20	10.4" Active Matrix Color	IV Type II	19.3	510MB	$	30402

All Toshiba Computers Are Bundled with MS-DOS, Windows 3.1, BatPoint Mouse with QuickPort and Toshiba Utilities Software

TEXAS INSTRUMENTS Texas Instruments Printers

TI microLaser Pro 600: 600DPI

◆ 8 PPM Engine Speed ◆ Adobe Postscript Level 2 (23 or 65 Fonts) ◆ 600 x 600 DPI Resolution in PostScript Mode ◆ 300 x 300 DPI in PCL5 Mode ◆ Adobe IntelliSelect Automatic Language Switching ◆ Bi-Directional Parallel and AppleTalk Interfaces Standard ◆ SCSI and RS-232 Serial Interfaces Optional ◆ 6MB RAM Standard, Expandable to 22 MB ◆ Two 250 Sheet Input Trays Standard: Letter and Envelope Ready ◆ 1 Year Parts and Labor Warranty

microLaser Pro PS23 PostScript (23 Fonts) ..... **$1315.82*** CDW 32069

microLaser Pro PS65 PostScript (65 Fonts) ..... **$1539.25** CDW 32068

*After $60.00 Manufacturer Rebate (through 3/31/94)

TI microWriter

◆ 300 DPI, LED Print Engine ◆ 5 PPM ◆ 16 MHz 68000 Controller with TI Proprietary ASICs ◆ Small Footprint - 13.8" x 10.4" ◆ .512K Standard, Upgradable to 4 MB ◆ Standard 250 Sheet Input Tray with Face Down and Face Up Output ◆ Front Control Panel ◆ Optional Multimedia Feeder and Second Paper Feeder

microWriter Basic ..... **$517.16** CDW 27064

microWriter PS23 Postscript (23 Fonts), 2MB **$677.13** CDW 27065

microWriter PS65 Postscript (65 Fonts), 2MB **$937.99** CDW 27066

TI microMarc

◆ Professional Quality Printing ◆ Reliable Performance ◆ Fast Print Speed ◆ Drop On Demand Thermal Inkjet (128 Nozzles) ◆ 300CPS ◆ 300 DPI ◆ PCL3 ◆ 24K Buffer ◆ 3 Fonts, Autosheet Feeder (100 Sheets)

microMarc ..... **$277.97** CDW 29698

If You Find a Better Price, Call CDW® Before You Buy!

CDW® Sells for Less and Services You Better!

(800) 337-4CDW

PCM832

©1994 CDW® Computer Centers, Inc

CALL FOR FREE CATALOG

COMPUTER DISCOUNT WAREHOUSE™

Advertising Sales Staff

One Park Avenue,
New York, NY 10016
212 503-5100

DISPLAY ADVERTISING

Dan Rosensweig - Associate Publisher
(212) 503-5354
Anna Zornosa - Associate Publisher/West Coast
(415) 378-5505
Lon Otremba - East Coast Advertising Director
(212) 503-4453
Bill Stephen National Sales Manager
(212) 503-5626
Ad Coordination Supervisor
Christine Holsten
(212) 503-5264
Advertising Coordinator
Julie Eigo
(212) 503-5107

NETWORK EDITION

Michael Wiener - Associate Publisher/Network Products
(415) 378-5565
Kimberly White - Eastern Advertising Manager/Network Products - Eastern Region & Midwest
(617) 393-3056
Account Representative
Allyson Deane
(212) 503-5044
Paul Klein - Western Advertising Manager/ Network Products - Western Region & Southwest
(415) 378-5546
Account Representative
Andrew Zeiger
(212) 503-5162

MA, NH, VT, ME, RI, Canada

District Sales Manager
Michael Bird (617) 393-3058
10 President's Landing, Mystic Center
Medford, MA 02155
(617) 393-3055
Account Representative
Ira Becker
(212) 503-5132

CT, NY, NJ, PA, OH

District Sales Manager
Michael Hatherill (212) 503-5128
One Park Avenue, 4th Floor
New York, NY 10016
(212) 503-5100
District Sales Manager
Lisa Friedman
(212) 503-5149

DE, MD, DC, VA, WV, NC, SC, AL, MS, TN, AR, KY, GA, FL

District Sales Manager
Frank Quigley (404) 814-8950
3405 Piedmont Road, Suite 460
Atlanta, GA 30305
(404) 814-8940
Account Representative
Robert Regan
(212) 503-5032

NE, WI, IL, IN, KS, MN, MO, MI, IA, ND, SD

District Sales Manager
Ken Beach
(312) 214-7330
150 North Wacker Drive, 25th Floor
Chicago, IL 60606
(312) 214-7300
Sr. Account Representative
Beth Boyle
(212) 503-5047

TX, OK, LA, NM

District Sales Manager
Todd Anderman (214) 360-5725
5956 Sherry Lane, Suite 625
Dallas, TX 75225
(214) 360-5725
Sr. Account Representative
Stephanie Brzozowski
(212) 503-5675

Mark Malloy - Southwest Area Manager
(213) 351-1860

CA (San Diego & Orange County), AZ, HI, CA (Los Angeles)

District Sales Manager
David Lynn (714) 852-5924
18301 Von Karman Avenue, Suite 330
Irvine, CA 92715
(714) 852-5914
District Sales Manager
Robin Kofsky
(714) 852-5920
Sr. Account Representative
Alysa Parisi
(212) 503-5113
Account Representative
Elizabeth O'Connor
(212) 503-5040

CA (San Jose)

District Sales Manager
Michael Klein (415) 378-5521
110 Marsh Drive, Suite 103
Foster City, CA 94404
(415) 378-5520

Account Representative
Adam Power
(212) 503-5663

Mike Kisseberth - Northwest Area Manager
(415) 378-5510

CA (San Francisco & North), ID, OR, WA, NV

110 Marsh Drive, Suite 103
Foster City, CA 94404
(415) 378-5520

Account Representative
Jeff Green
(212) 503-5129

CA (South San Francisco to Mountainview), CO, UT, WY, AK, MT

District Sales Manager
Kristy Newton (415) 378-6859
110 Marsh Drive, Suite 103
Foster City, CA 94404
(415) 378-5520

Account Representative
Tim Castelli
(212) 503-5125

For more information regarding *display* advertising please call:
212 503-5100
1-800-33MAG AD

CENTRAL ADVERTISING

VP, Central Advertising
Robert A. Bader

Director of Sales & Marketing
Paul Fusco

Sales Manager
Monte Wasch

Production Director
Vicki Egan

Sr. Production Coordinator
Nadine Messier

Production Coordinator
Berhan Asmarom

AL, AR, FL, GA, LA, MS, NC, SC, TN, TX, VA

Account Manager
Leslie Eddy
(212) 503-5171

AK, AZ, CA (209, 213, 310, 619, 714, 805, 818, 909), CN, NM, OK, HI, Foreign

Account Representative
Carolyn Goldfarb
(212) 503-5076

CT, IA, IL, IN, ME, MI, NH, NJ, MI, RI, VT, WI

Sr. Account Representative
Bill Herbst
(212) 503-5193

CA (209, 408, 410, 415, 707, 916)

Account Representative
R.J. Kirkland
(212) 503-5118

DC, NY, PA, DE, MD, OH, WV, KY

Account Representative
James Meyer
(212) 503-5150

CO, ID, KS, MN, MO, MT, ND, NE, NV, OR, SD, UT, WA, WY

Account Representative
Maggie Hewit
(212) 503-5156

Business Card Advertising
Call: 1-800-825-4237
PC Magazine Marketplace
3rd Floor, One Park Ave.
New York, NY 10016

For more information regarding *central* advertising please call:
212 508-5115
1-800-825-4237

Advertisers' Index

COMPANIES

Reader Service No.	Advertiser	Page
110	3 Com Corporation	76-77
910	3M Data Storage Products	261
034	Acer America	81-85
226	ADI Systems Inc	45
*	AMBRA COMPUTER CORPORATION	106-109
*	AMBRA COMPUTER CORPORATION	156-157
165	Amdek	365
*	America Online, Inc	151-152
162	American Power Conversion	260
235	AMS	372
*	Apple Computers	41
*	Apple Computers	232-233
336	Arlington Computer Products	385-387
*	AST Research	20-21
127	ATI Technologies Inc	86
012	Austin Computer Systems	190-193
129	Avery Dennison	300
318	Aztech Labs, Inc	104
285	Borland International	6
220	Borland International	51
328	Buffalo Products	228
015	Bulldog Computer Products	398
292	Caere Corporation	57
341	Calera Recognition System	47
094	CBIS, Inc	63
*	Chipsoft Inc	245
073	Colorado Memory Systems	70-71
*	Communication Intelligence	36
*	Compaq Computer Corporation	115
*	Compaq Computer Corporation	119
137	Compaq Computer Corporation	146-147
126	CompuAdd	225-227
144	CompUSA Direct	96-97
274	CompuServe	145
300	Computability	340-341
193	Computer Associates	5
159	COMPUTER DISCOUNT WAREHOUSE	437
109	COMPUTER DISCOUNT WAREHOUSE	438, 441
360	COMPUTER DISCOUNT WAREHOUSE	442-443
158	Computer Library	404
316	Comtrade	388-389
322	Corel Corporation	13
329	CTX International	229
901	DCA	23
*	DEE ONE SYSTEMS	384
*	Dell Computer Corporation	307
*	Dell Computer Corporation	334-335
*	Dell Computer Corporation	C5-C8
*	Digital Equipment Corporation	247-254
347	DUSTIN DISCOUNT SOFTWARE	339
*	Epson America	10-11
003	ExpoTech/VTech	346
305	ExpoTech/VTech	350-355
014	First Source International	373-375
*	Gateway 2000	129-142
*	Gateway 2000	280-281
102	GEnie (GEISCO)	121, 123-125
277	Global Horizons, Inc	399
391/349	H.Co Memory Upgrades	397
*	Hewlett Packard	58-59
*	IBM Corporation	74-75
*	IBM Corporation	203-206
054	Inmac	376-377
219	Insight Distribution Network	392-395
*	Intel Corporation	177-180
363	Intel Corporation	270-273
048	Intergraph Corp	64-65
242	Kenosha Computer Center	378
019	L.A. Trade	403
182	Logitech	262-263
143	Lotus Development Corporation	26-27
*	Lotus Development Corporation	102-103
*	Lotus Development Corporation	216
*	Lotus Development Corporation	234
263	Macola, Inc	257
275	Macromedia	98
067	Mag Innovision	34-35
365	Manugistics	89
124	Matrox, Inc	94
325	Media Magic	195
130	Media Vision	276
018	MegaHaus	396
383	Memory Direct	400
085	Micro Electronics	69
855	Micro Solutions Computer Products	301
230	Micrografx	239
361	Micrografx	241
317	Micrografx	243
119	Micron Computer, Inc	183-186
*	Microsoft	2-3
*	Microsoft	72
010	Midwest Computer Works	390-391
398	Midwest Micro	379-383
280	Mitsubishi Display Products	172-173
283	Nanao Corporation	164
*	NCR Corporation	289-292
045	NEC Technologies	C2-1
157	NEC Technologies	90-91
239	NEC Technologies	284-286
878	Network Express	401
*	Nokia	160
346	Norton Lambert	43
858	NOTIS Systems	159
056	Okidata	101
223	Optical Coating Laboratory Inc	201
350	Orchid Technology	175
301	Patton & Patton	256
*	PC Connection	343-345
080	PC Power & Cooling	67
238	PCs Compleat	358-359
092	PCs Compleat	360-361
268	PCs Compleat	362-363
026	Personics	4
098	Pinnacle Micro	347
345	Powersoft Corporation	196-199
294	Prentice Hall	308
148	Primavera Systems	60
309	S.A.G./Storage Solutions	402
046	Samsung Information Systems	212-213
296	Samtron Displays Inc	18
*	Sharp Electronics Corp	78
282	Software Spectrum	349
071	Sony Computer Peripheral	166-167
377	Sony Recording Media	55
061	Stac Electronics	16-17
117	Symantec Corporation	28
001	Tektronix Inc	53
304	Texas Instruments	127
353	Texas Instruments	217-223
379	Toshiba America	298-299
004	Touchstone Software	80
920	US Robotics Inc	266
065	USA Flex	366-367
210	USA Flex	368-369
055	USA Flex	370-371
343	Valueline	357
118	View Sonic	188
103	Wollongong Group	282
*	WordPerfect Corporation	14-15
063	Zeos Int'l	24-25
038	Zeos Int'l	33
155	Zeos Int'l	48A-48F
036	Zeos Int'l	92

* No Reader Service #. Please Call Advertiser For Information.

Advertisers' Index
PRODUCTS

Reader Service No.	Company	Product	Page
	ACCELERATOR BOARDS		
124	Matrox, Inc.	Matrox MGA II	94
309	S.A.G./Storage Solutions	Storage	402
	ACCOUNTING SOFTWARE		
263	Macola, Inc.	Accounting Software	257
	ADD-ON BOARDS		
127	ATI Technologies Inc.	Graphics Accelerator Cards	86
318	Artech Labs, Inc.	Pro 16 Upgrade Kit	104
015	Bulldog Computer Products	Hardware/Peripherals/MailOrder	398
014	First Source International	Memory	373-375
361/349	H Co Memory Upgrades	Memory, PCMCIA	397
182	Logitech	SoundMan Wave, Sound Advice	262-263
124	Matrox, Inc.	Matrox MGA II	94
130	Media Vision	Media Vision Sound Family	276
*	NCR Corporation	PCs, Notebooks	289-292
	APPLE PRODUCTS		
*	Apple Computers	MAC's	41
*	Apple Computers	PC Direct Sell	232-233
	BACKUP SOFTWARE		
856	Micro Solutions Computer Products	Tape Backup	301
	BOOKS		
*	Microsoft	Microsoft Press	72
294	Prentice Hall	On Line Books	308
	CAD/CAM		
048	Intergraph Corp.	MicroStation	64-65
	CD-ROM		
015	Bulldog Computer Products	Hardware/Peripherals/MailOrder	398
300	Computability	Mail Order	340-341
158	Computer Library	Computer Select	404
219	Insight Distribution Network	CD-ROM	392-395
130	Media Vision	Media Vision Sound Family	276
856	Micro Solutions Computer Products	CD-ROM	301
157	NEC Technologies	CD ROM	90-91
343	Valuelink	Peripherals, Mail Order	357
	CHIPS/PROCESSORS		
328	Buffalo Products	Upgrade Kits	228
361/349	H Co Memory Upgrades	Memory, PCMCIA	397
*	Intel Corporation	Manufacturing	177-180
363	Intel Corporation	Overdrive	270-273
	COMMUNICATIONS SOFTWARE		
901	DCA	RLN 2.0	23
858	NOTIS Systems	Windows Graphical Interface	159
	COMPUTERS/COMPATIBLES		
034	Acer America	PCs and Notebooks	81-85
*	AMBRA COMPUTER CORPORATION	PCs	108-109
*	AMBRA COMPUTER CORPORATION	PCs	156-157
*	Apple Computers	PC Direct Sell	232-233
336	Arlington Computer Products	Peripherals	385-387
*	AST Research	Bravo	20-21
012	Austin Computer Systems	Austin Desktops	190-193
*	Compaq Computer Corporation	Corona Bundle	119
137	Compaq Computer Corporation	Deskpro XE	146-147
128	CompuAdd	CompuAdd Systems	225-227
144	CompUSA Direct	Mail Order	96-97
316	Comtrade	Systems	388-389
*	DEE ONE SYSTEMS	Systems	394
*	Dell Computer Corporation	Dell Systems	307
*	Dell Computer Corporation	Dell Systems	334-335
*	Dell Computer Corporation	Dell Systems	C5-C8
*	Digital Equipment Corporation	Systems	247-254
305	ExpoTech/VTech	486 DX2/50 Mhz, 486 SX/25 Mhz	350-355
*	Gateway 2000	PCs	129-142
*	Gateway 2000	Pentium PC's	280-281
277	Global Horizons, Inc.	Systems/Components	399
*	Hewlett Packard	HP PC's	58-59
*	IBM Corporation	Valuepoint Systems	203-206
054	Inmac	Systems	376-377
219	Insight Distribution Network	Mail Order Systems	392-395
119	Micron Computer, Inc.	Micron PCs	183-186
018	Midwest Computer Works	PC's, Hardware	390-391
398	Midwest Micro	Desktop Systems	379-383
878	Network Express	Network Mail Order	401
065	USA Flex	Desktops PCs	366-367
210	USA Flex	Desktop PCs	368-369
055	USA Flex	Desktop PCs	370-371
343	Valuelink	Peripherals, Mail Order	357
038	Zeos Int'l	AMBRA	33
156	Zeos Int'l	Zeos Upgradables	48A-48F
	DATA BASE MANAGERS		
285	Borland International	Paradox	6
220	Borland International	Dbase	51
026	Personics	Monarch	4
	DATA COMPRESSION SOFTWARE		
061	Stac Electronics	Stacker	16-17
	DATA ENTRY SOFTWARE		
365	Manugistics	Statgraphics Plus	89

Reader Service No.	Company	Product	Page
	DESK TOP PUBLISHING		
322	Corel Corporation	Corel Ventura	13
317	Micrografx	Picture Publisher	243
*	Microsoft	Microsoft Office	2-3
	DISK BACKUP & TAPE DRIVES		
810	3M Data Storage Products	3M Data Storage Products	281
073	Colorado Memory Systems	Tape Backup	70-71
300	Computability	Mail Order	340-341
325	Media Magic	Audio Boards and Sound Systems	195
018	MegaHaus	Drives/Storage	396
856	Micro Solutions Computer Products	Disk Drives, Tape Backup	301
343	Valuelink	Peripherals, Mail Order	357
	DISKETTES		
377	Sony Recording Media	Data Cartridges	56
	DISPLAYS/MONITORS/TERMINALS		
226	ADI Systems Inc.	Monitors	45
165	Amdek	Monitors	365
015	Bulldog Computer Products	Hardware/Peripherals/MailOrder	398
329	CTX International	Monitors	229
*	DEE ONE SYSTEMS	Monitors	394
067	Mag Innovision	Monitors	34-35
280	Mitsubishi Display Products	Monitors	172-173
283	Hanao Corporation	Monitors	164
045	NEC Technologies	Multi-Sync Monitors	C2-1
*	Nokia	MultiGraph Series	160
223	Optical Coating Laboratory Inc.	Glare/Guard Screen Filters	201
046	Samsung Information Systems	Monitors	212-213
296	Samtron Displays Inc.	Monitors	18
071	Sony Computer Peripheral	Monitors	166-167
343	Valuelink	Peripherals, Mail Order	357
118	View Sonic	Monitors	188
	ENTERTAINMENT SOFTWARE		
274	CompuServe	On Line Services	145
	FLOWCHARTING		
230	Micrografx	ABC Flowcharter	238
301	Patton & Patton	Flowcharting Software	256
	GRAPHICS SOFTWARE		
014	First Source International	Mail Order Software	373-375
275	Macromedia	Macromedia Action	98
361	Micrografx	Designer 4.0	241
317	Micrografx	Picture Publisher	243
858	NOTIS Systems	Windows Graphical Interface	159
	HAND-HELD PC'S		
*	Sharp Electronics Corp.	Wizard	78
	HARD DISKS		
300	Computability	Mail Order	340-341
*	DEE ONE SYSTEMS	Hard Drives	394
219	Insight Distribution Network	Hard Drives	392-395
018	MegaHaus	Drives/Storage	396
856	Micro Solutions Computer Products	Disk Drives, Tape Backup	301
309	S.A.G./Storage Solutions	Storage	402
	HARDWARE		
159	COMPUTER DISCOUNT WAREHOUSE	Hardware	437
109	COMPUTER DISCOUNT WAREHOUSE	Hardware	438-441
360	COMPUTER DISCOUNT WAREHOUSE	Hardware	442-443
054	Inmac	Systems	376-377
398	Midwest Micro	Notebooks/Desktops/Peripherals	379-383
	INFORMATION MANAGERS		
*	Lotus Development Corporation	Lotus Organizer	216
345	Powersoft Corporation	Information ManagementSoftware	196-199
	INPUT DEVICES		
*	Communication Intelligence	Handwriter for Windows	38
	INTEGRATED SOFTWARE		
014	First Source International	Mail Order Software	373-375
*	Lotus Development Corporation	SmartSuite	102-103
*	Microsoft	Microsoft Office	2-3
282	Software Spectrum	Microsoft Office Pro	348
*	WordPerfect Corporation	WordPerfect Suite	14-15
	LAN ADAPTER BOARDS		
094	CBIS, Inc.	Desk to Desk	83
878	Network Express	Network Mail Order	401
	LOCAL AREA NETWORKING		
110	3 Com Corporation	Parallel Tasking	76-77
300	Computability	Mail Order	340-341
109	COMPUTER DISCOUNT WAREHOUSE	Networking Products	438-441
360	COMPUTER DISCOUNT WAREHOUSE	Networking Products	442-443
901	DCA	RLN 2.0	23
878	Network Express	Network Mail Order	401
103	Wollongong Group	Management Station	282
	MAIL ORDER		
034	Acer America	PCs and Notebooks	81-85
*	AMBRA COMPUTER CORPORATION	PCs, Notebooks	108-109
*	AMBRA COMPUTER CORPORATION	PCs, Notebooks	156-157
165	Amdek	Monitors	365

Advertisers' Index
PRODUCTS

Reader Service No.	Company	Product	Page
235	AMS	Notebooks	372
*	Apple Computers	PC Direct Sell	232-233
336	Arlington Computer Products	Mail Order	385-387
015	Bulldog Computer Products	Hardware/Peripherals/MailOrder	398
*	Compaq Computer Corporation	LTE Lite Solution Paq	115
*	Compaq Computer Corporation	Contura Bundle	119
126	CompuAdd	CompuAdd Systems	225-227
144	CompUSA Direct	Mail Order	96-97
300	Computability	Mail Order	340-341
158	COMPUTER DISCOUNT WAREHOUSE	Networking Products	437
316	Comtrade	Mail Order	388-389
347	DUSTIN DISCOUNT SOFTWARE	Mail Order	338
003	ExpoTech/VTech	Notebooks	346
305	ExpoTech/VTech	Mail Order	350-355
014	First Source International	Memory	373-375
*	Gateway 2000	Mail Order	129-142
*	Gateway 2000	Mail Order	280-281
277	Global Horizons, Inc	Peripherals	399
391/349	H Co Memory Upgrades	Memory, PCMCIA, Fax/Modem, LAN	397
*	IBM Corporation	Thinkpad	74-75
*	IBM Corporation	Valuepoint Systems	203-206
054	Inmac	Systems	376-377
242	Kenosha Computer Center	Mail Order	378
019	L.A. Trade	Mail Order	403
139	Media Vision	Media Vision Sound Family	276
018	MegaHaus	Drives/Storage	396
383	Memory Direct	Memory	400
010	Midwest Computer Works	Mail Order	390-391
*	NCR Corporation	PCs, Notebooks	289-292
678	Network Express	Network Mail Order	401
*	PC Connection	Mail Order	343-345
238	PCs Compleat	Mail Order	358-359
092	PCs Compleat	Mail Order	360-361
288	PCs Compleat	Mail Order	362-363
309	S.A.G./Storage Solutions	Storage	402
095	USA Flex	Notebooks/PCs/Printers	366-367
210	USA Flex	Notebooks/PCs/Printers	368-369
055	USA Flex	Notebooks/PCs/Printers	370-371
343	Valuelne	Mail Order	357
053	Zeos Int'l	Freestyle/Contenda	24-25
038	Zeos Int'l	AMBRA	33
155	Zeos Int'l	Zeos Upgradables	48A-48F
036	Zeos Int'l	Zeos Colomots	92

MASS STORAGE

073	Colorado Memory Systems	Tape Backup	70-71
300	Computability	Mail Order	340-341
309	S.A.G./Storage Solutions	Storage	402

MEMORY

328	Buffalo Products	Upgrade Kits	228
014	First Source International	Memory	373-375
391/349	H.Co Memory Upgrades	Memory	397
019	L.A. Trade	Memory	403
383	Memory Direct	Memory	400

MISCELLANEOUS

274	CompuServe	On Line Services	145
855	Micro Solutions Computer Products	Tape Backup,Disk Drives,CD-ROM	301

MODEMS

300	Computability	Mail Order	340-341
920	US Robotics Inc	Total Control Modem Pool	286

MULTI-MEDIA

318	Aztech Labs, Inc	Pro 16 Upgrade Kit	104
219	Insight Distribution Network	Multimedia	392-395
275	Macromedia	Macromedia Action	98
139	Media Vision	Media Vision Sound Family	276

OCR PRODUCTS

292	Caere Corporation	Fax and Find	57
341	Calera Recognition System	WordScan Plus 2.0	47

ON LINE DATABASE

*	America Online, Inc	America OnLine	151-152
274	CompuServe	On Line Services	145
102	GEnie (GEISCO)	GEnie OnLine Service	121, 123-125
858	NOTIS Systems	Windows Graphical Interface	159
294	Prentice Hall	On Line Books	308

OPTICAL PERIPHERALS

090	Pinnacle Micro	Optical Drives	347

ORGANIZATIONS/SERVICES

274	CompuServe	On Line Services	145

PC ACCESSORIES

855	Micro Solutions Computer Products	Tape Backup,Disk Drives,CD-ROM	301

PC DIRECT

165	Amdek	Monitors	365
235	AMS	Notebooks	372
336	Arlington Computer Products	Mail Order, Peripherals	385-387
015	Bulldog Computer Products	Hardware/Peripherals/MailOrder	398
300	Computability	Mail Order	340-341
109	COMPUTER DISCOUNT WAREHOUSE	Mail Order	438-441
360	COMPUTER DISCOUNT WAREHOUSE	Mail Order	442-443
316	Comtrade	Systems/Mail Order	388-389
*	DEE ONE SYSTEMS	Mail Order	394

Reader Service No.	Company	Product	Page
347	DUSTIN DISCOUNT SOFTWARE	Mail Order	338
003	ExpoTech/VTech	Notebooks	346
305	ExpoTech/VTech	Mail Order	350-355
014	First Source International	Memory	373-375
277	Global Horizons, Inc	Peripherals	399
391/349	H Co Memory Upgrades	Memory, PCMCIA, Fax/Modem, LAN	397
054	Inmac	Systems	376-377
219	Insight Distribution Network	Mail Order	392-395
242	Kenosha Computer Center	Mail Order	378
019	L.A. Trade	Memory/Mail Order	403
018	MegaHaus	Drives/Storage	396
383	Memory Direct	Memory	400
010	Midwest Computer Works	Hardware, PC's, Monitors	390-391
398	Midwest Micro	Notebooks/Desktops/Peripherals	379-383
678	Network Express	Network Mail Order	401
*	PC Connection	Mail Order	343-345
092	PCs Compleat	Mail Order	360-361
098	Pinnacle Micro	Optical Drives	347
309	S.A.G./Storage Solutions	Storage	402
282	Software Spectrum	Microsoft Office Pro	349
095	USA Flex	Notebooks/PCs/Printers	366-367
210	USA Flex	Notebooks/PCs/Printers	368-369
055	USA Flex	Notebooks/PCs/Printers	370-371
343	Valuelne	Peripherals, Mail Order	357

PCMCIA

391/349	H Co Memory Upgrades	Fax/Modems,Flash,SRAM, Drives	397

PERIPHERALS

336	Arlington Computer Products	Peripherals	385-387
158	COMPUTER DISCOUNT WAREHOUSE	Peripherals	437
109	COMPUTER DISCOUNT WAREHOUSE	Peripherals	438-441
360	COMPUTER DISCOUNT WAREHOUSE	Peripherals	442-443
*	DEE ONE SYSTEMS	Peripherals	394
*	Gateway 2000	Peripherals	129-142
*	Gateway 2000	Peripherals	280-281
277	Global Horizons, Inc	Peripherals	399
398	Midwest Micro	Peripherals	379-383
678	Network Express	Network Mail Order	401
210	USA Flex	Peripherals	368-369
055	USA Flex	Peripherals	370-371
343	Valuelne	Peripherals	357

PORTABLE/LAP COMPUTERS

034	Acer America	PCs and Notebooks	81-85
*	AMBRA COMPUTER CORPORATION	Notebooks	108-109
*	AMBRA COMPUTER CORPORATION	Notebooks	156-157
235	AMS	Notebooks	372
012	Austin Computer Systems	Austin Notebooks	190-193
*	Compaq Computer Corporation	LTE Lite Solution Paq	115
126	CompuAdd	CompuAdd Systems	225-227
144	CompUSA Direct	Mail Order	96-97
158	COMPUTER DISCOUNT WAREHOUSE	Laptops	437
109	COMPUTER DISCOUNT WAREHOUSE	Laptops	438-441
360	COMPUTER DISCOUNT WAREHOUSE	Laptops	442-443
*	Digital Equipment Corporation	Systems	247-254
003	ExpoTech/VTech	Notebooks	346
305	ExpoTech/VTech	Notebooks	350-355
*	Gateway 2000	Notebooks	129-142
*	Gateway 2000	Notebooks	280-281
277	Global Horizons, Inc	Systems/Components	399
*	IBM Corporation	Thinkpad	74-75
085	Micro Electronics	Winbook	89
010	Midwest Computer Works	Hardware, PC's	390-391
398	Midwest Micro	Notebooks	379-383
*	NCR Corporation	PCs, Notebooks	289-292
239	NEC Technologies	Versa	284-288
353	Texas Instruments	TI Notebooks	217-223
379	Toshiba America	T4700C Notebooks	298-299
095	USA Flex	Notebooks	366-367
210	USA Flex	Notebooks	368-369
055	USA Flex	Notebooks	370-371
053	Zeos Int'l	Freestyle/Contenda	24-25
038	Zeos Int'l	AMBRA	33
036	Zeos Int'l	Zeos Colomots	92

POWER PROTECTION

162	American Power Conversion	BackUPS	280
080	PC Power & Cooling	PowerProtection/CoolingDevices	67

PRESENTATION SOFTWARE

275	Macromedia	Macromedia Action	98
317	Micrografx	Picture Publisher	243

PRINTER ACCESSORIES

129	Avery Dennison	Ink Jet Labels	300

PRINTERS

144	CompUSA Direct	Mail Order	96-97
300	Computability	Mail Order	340-341
058	Okidata	LED Printers	101
001	Tektronix Inc	Phaser 220 Color Printers	53
304	Texas Instruments	TI Printers	127
210	USA Flex	Printers	368-369
055	USA Flex	Printers	370-371

PROGRAMMERS TOOLS UTILITIES

345	Powersoft Corporation	Information ManagementSoftware	196-198

Advertisers' Index
PRODUCTS

Reader Service No.	Company	Product	Page
	PROJECT MANAGEMENT		
202	Caere Corporation	Fax and Find	57
193	Computer Associates	CA - Superproject	5
146	Primavera Systems	Project Management	80
	REMOTE COMPUTING		
901	DCA	RLN 2.0	23
346	Norton Lambert	Close Up	43
920	US Robotics Inc	Total Control Modem Pool	266
103	Wollongong Group	Management Station	282
	RESELLERS		
144	CompUSA Direct	Mail Order	96-97
158	COMPUTER DISCOUNT WAREHOUSE	Reseller	437
108	COMPUTER DISCOUNT WAREHOUSE	Reseller	438-441
360	COMPUTER DISCOUNT WAREHOUSE	Reseller	442-443
347	DUSTIN DISCOUNT SOFTWARE	Mail Order	339
277	Global Horizons, Inc.	Peripherals	399
818	MegaHaus	Drives/Storage	396
383	Memory Direct	Memory	400
010	Midwest Computer Works	Reseller	390-391
	SCANNERS/DIGITIZERS		
*	Epson America	Espon 800C Pro	10-11
	SERVERS		
309	S.A.G./Storage Solutions	Storage	402
	SHAREWARE SOFTWARE		
094	CBIS, Inc.	Desk to Desk	63
	SOFTWARE		
094	CBIS, Inc.	Desk to Desk	63
274	CompuServe	On Line Services	145
300	Computability	Mail Order	340-341
193	Computer Associates	CA - Superproject	5
901	DCA	RLN 2.0	23
347	DUSTIN DISCOUNT SOFTWARE	Mail Order	339
048	Intergraph Corp.	MicroStation	64-65
365	Manugistics	Statgraphics Plus	89
346	Norton Lambert	Close Up	43
146	Primavera Systems	Project Management	80
	SPREADSHEET TEMPLATES		
*	Lotus Development Corporation	Lotus 1-2-3 for Windows	234
	STATISTICAL SOFTWARE		
365	Manugistics	Statgraphics Plus	89
	TAX SOFTWARE		
*	Chipsoft Inc.	TurboTax	245
	UTILITIES		
014	First Source International	Mail Order Software	373-375
346	Norton Lambert	Close Up	43
004	Touchstone Software	Check It Pro	80
	VERTICAL MARKET SOFTWARE		
365	Manugistics	Statgraphics Plus	89
	VIDEO GRAPHICS BOARDS		
127	ATI Technologies Inc.	Graphics Accelerator Cards	86
300	Computability	Mail Order	340-341
*	DEE ONE SYSTEMS	Video Cards	384
124	Matrox, Inc	Matrox MGA II	94
325	Media Magic	Audio Boards and Sound Systems	195
350	Orchid Technology	Kelvin 64	175
	WINDOWS SOFTWARE		
285	Borland International	Paradox	6
220	Borland International	Dbase	51
341	Calera Recognition System	WordScan Plus 2.0	47
193	Computer Associates	CA - Superproject	5
014	First Source International	Mail Order Software	373-375
143	Lotus Development Corporation	Lotus Ami Pro Release 3.0	26-27
*	Lotus Development Corporation	SmartSuite	102-103
*	Lotus Development Corporation	Lotus Organizer	216
*	Lotus Development Corporation	Lotus 1-2-3 for Windows	234
365	Manugistics	Statgraphics Plus	89
230	Micrografx	ABC Flowcharter	239
361	Micrografx	Designer 4.0	241
317	Micrografx	Picture Publisher	243
*	Microsoft	Microsoft Office	2-3
346	Norton Lambert	Close Up	43
858	NOTIS Systems	Windows Graphical Interface	159
282	Software Spectrum	Microsoft Office Pro	349
117	Symantec Corporation	Norton Desktop for Windows	28
*	WordPerfect Corporation	WordPerfect Suite	14-15
	WORD PROCESSING SOFTWARE ADS		
143	Lotus Development Corporation	Lotus Ami Pro Release 3.0	26-27
282	Software Spectrum	Microsoft Office Pro	349
	WORK GROUP SOFTWARE		
094	CBIS, Inc.	Desk to Desk	63

For Additional Categories See MARKETPLACE PRODUCT INDEX Page 405

PC MAGAZINE

Coming Up

Subnotebooks

How much weight can a portable computer shed without becoming too wimpy for everyday use? Now that subnotebooks are sporting 486-class CPUs, there is an opportunity for a lighter, gentler approach to computing on the road. *PC Magazine* takes a look at ten of today's newest subnotebooks in an attempt to see what you give up in the quest for convenience.

LAN Backup Software

Backing up the data on a small- or mid-sized network can be a chore, or it can be about as simple as a few mouse clicks. The right software makes it easy. *PC Magazine* tests nine LAN backup products that support DAT drives and look at how each handles automating the process, managing the tapes, and restoring both individual files and entire servers. We also check out the hardware and the network operating systems that they support. We'll help you choose the best system to keep your data safe.

Forms Software

The paperless office is no longer a fantasy. With a network and an e-mail system, companies can simplify and optimize their flow of information while controlling who sees what. *PC Magazine* evaluates five forms software systems that provide design, filler, security, and routing functions. We test each package's abilities in each of these areas in addition to their ability to print high-quality output.

C++ Development Packages

To help C++ developers cope with today's mammoth projects, compiler vendors have revolutionized their products. Intuitive visual design tools, tightly integrated development environments, Windows-aware frameworks, powerful debugging features, and support for 32-bit apps are just the highlights. We test ten C++ development packages—including ground-breaking new releases from Borland, Microsoft, and Symantec—for usability and performance.

Video as a Data Type

Just when corporate developers had figured out all of the nuances of text and numbers, along comes a new data type to worry about. When the CEO says "If a picture is worth a thousand words, a movie must be worth a million," get ready to add digital video to your company's applications. Next month, learn about the special requirements for digital video in the Corporate Developer column.

Editorial Product Index

Reader Service No.	Product	Company	Page
465	Aamazing CM-1528	Aamazing Technologies Corp	176
442	Absolute Beginner's Guide to Networking	Sams Publishing	71
413	ActionWorkflow System for Lotus Notes	Action Technologies Inc.	66
481	Addonics C143	Fora International Corp.	176
482	Addonics C152/LR	Fora International Corp.	176
466	ADI MicroScan 3G	ADI Systems Inc.	181
467	ADI MicroScan 3GP Low Radiation	ADI Systems Inc.	181
468	ADI MicroScan 4G	ADI Systems Inc.	181
469	ADI MicroScan 4GP Low Radiation	ADI Systems Inc.	181
417	Air Travel Manager	Personal ExpertWare Inc.	68
453	AM-TAX Personal 1040	AM Tax Software, Inc.	238
470	Amax Impression 3	Amax Engineering Corp.	181
471	Amax Impression 5	Amax Engineering Corp.	181
448	America Online	America Online Inc.	126
454	Andrew Tobias' TaxCut for Dos	MECA Software Inc	240
454	Andrew Tobias' TaxCut for Windows	MECA Software Inc	240
472	AOC Spectrum Series 4N	AOC International (USA) Ltd.	182
473	AOC Spectrum Series 5S	AOC International (USA) Ltd	182
443	AST Manhattan SMP P/60	AST Research Inc.	300
459	Big Anthony's Mixed-Up Magic	Putnam New Media	451
402	BitFax Professional 3.0 for Windows	Bit Software Inc.	61
455	CA-Simply Tax for DOS	Computer Associates International, Inc.	255
455	CA-Simply Tax for Windows	Computer Associates International, Inc.	255
432	Canon IX-4015	Canon Computer Systems Inc.	44
422	CardGrabber, Version 1.0	Pacific Crest Technologies Inc.	56
420	Columbia Dictionary of Quotations	Aapex Software Corp.	50
444	Compaq ProLiant 2000 5/66 M4200A	Compaq Computer Corp.	301
449	CompuServe Information Service	CompuServe Inc.	128
424	Corel CD PowerPak	Corel Corp.	48
474C	TX 1561LR	CTX International Inc.	182
475	Darius HRN-14VLP	Darius Technology Ltd.	187
476	Darius HRN-15VLP	Darius Technology Ltd.	187
404	Designworks 2	GST Software	61
411	DI-OGIX version 3.0D	On Top Systems Inc.	66
478	Digital PCX8V-BC	Digital Equipment Corp.	187
477	Digital PCX8V-DE	Digital Equipment Corp.	187
450	Dow Jones News/Retrieval	Dow Jones & Co.	128
479	ETC ViewMagic CA-1464SP	ETC Computer Inc.	189
480	ETC ViewMagic CA-1565SP	ETC Computer Inc.	189
451	GEnie	General Electric Information Service	150
483	GoldStar Model 1510	GoldStar Technology Inc.	189
522	Gpf, Version 2.1	Gpf Systems Inc.	321
501	The French Horn	Orchestra MultiSystems Inc	214
418	Handwriter for Windows	Communication Intelligence Corp	42
441	How Networks Work	Ziff-Davis Press	71
445	HP NetServer 5/60 LM	Hewlett-Packard Co.	305
484	Hyundai HCM-447E	Hyundai Electronics America	194
485	IBM 14P Color Monitor	IBM Personal Computer Co.	194
486	IBM 15P Color Monitor	IBM Personal Computer Co	194
426	IdeaFisher for Windows, Version 5.0	IdeaFisher Systems Inc.	48
460	It's a Bird's Life	Sanctuary Woods Multimedia Corp	451
519	Kasparov's Gambit	Electronic Arts Inc.	454
488	KFC CA-1508	KFC-USA Corp.	200
487	KFC CM-1428MD2	KFC-USA Corp.	200
421	LapLink Wireless, Version 1.0	Traveling Software Inc.	46
419	Leadview 3.0 for Windows	Lead Technologies Inc.	50
489	Liberty CL-9015	Liberty Electronics	200
409	LitePro 540	In Focus Systems Inc.	62
490	MAG DX15F	MAG InnoVision Inc.	202
415	The Major BBS, version 6.2	Galactocomm Inc.	68
450	MCI Mail	MCI Global Messaging Service	128
406	METZ Phones 5.0	METZ Software Inc.	62
423	Micrografx Charisma, Version 4.0	Micrografx Inc.	40
425	Microsoft Excel, Version 5.0	Microsoft Corp.	37
491	Mitsuba M715VS	Mitsuba Corp.	202
492	Mitsubishi Diamond Scan 15FS	Mitsubishi Electronics America Inc.	207
427	Mondial, Version 1.0	M-USA Business Systems Inc.	52
430	MorphWizard, Version 1.0	ImageWare Software Inc.	54
493	Nanao FlexScan F340iW	Nanao USA Corp.	208
431	Nanao FlexScan F780iW	Nanao USA Corp.	49
494	NEC MultiSync 3V	NEC Technologies Inc.	209
495	NEC MultiSync 4FGe	NEC Technologies Inc.	209
433	NEC UltraLite Versa 50EC	NEC Technologies Inc.	37
498	Nokia Multigraph 449E	Nokia Consumer Electronics	214
497	Nokia Multigraph 44BS	Nokia Consumer Electronics	214
410	OPEN/query builder	Wang Laboratories Inc.	66
499	Optiquest 1500D	Optiquest Inc.	217
503	Packard Bell PB8515SVGL	Packard Bell Electronics Inc.	219
502	Packard Bell PB8549SVGL	Packard Bell Electronics Inc.	219
409	PanelBook 530	In Focus Systems Inc.	62
403	PC Tools for Windows Version 2.0	Central Point Software Inc.	68
456	Personal Tax Edge for DOS	Parsons Technology Inc.	255
456	Personal Tax Edge for Windows	Parsons Technology Inc.	256
461	Peter Pan: A Story Painting Adventure	Electronic Arts Inc.	453
504	Philips Brilliance 15	Philips Consumer Electronics Co.	220
452	Prodigy Interactive Personal Service	Prodigy Services Co.	158
428	QmodemPro 1.0 for Windows	Mustang Software Inc.	56
401	QMS 2001 Knowledge System	QMS Inc.	61
505	Relisys RE-1564	Relisys	221
506	Relisys TF-1560	Relisys	221
508	Sampo AlphaScan 15	Sampo Corp. of America	223
509	Sampo AlphaScan 15e	Sampo Corp. of America	223
507	Sampo AlphaScan Plus	Sampo Corp. of America	223
510	Samtron SC-528UXL	Samtron Displays Inc.	224
511	Sceptre CC-615L	Sceptre Technologies Inc.	202
512	Sigma Designs Ergo View 15	Sigma Designs Inc.	224
462	Slater and Charlie Go Camping	Sierra On-Line Inc.	453
513	Sony CPD-1430	Sony Electronics Inc.	228
429	SpinRite, Version 3.1	Gibson Research Corp.	54
405	Statgraphics Plus for Windows	Manugistics Inc.	61
405	Statgraphics Plus Version 7	Manugistics Inc.	61
405	Statgraphics Version 7	Manugistics Inc.	61
496	SuperScan 15s	Nissei Sangyo America/Hitachi	211
520	Taxi	News Electronic Data Inc.	453
457	TaxPerfect Personal 1040	Financial Services Marketing Corp.	259
407	Tektronix Phaser 220e	Tektronix Inc.	66
407	Tektronix Phaser 220i	Tektronix Inc.	66
523	3-D Dinosaur Adventure	Knowledge Adventure	452
421	TI TravelMate 4000E WinDX2/50 Dual Scan Color	Texas Instruments Inc.	38
463	The Tortoise and The Hare	Broderbund Software Inc.	452
435	Toshiba T4700CT	Toshiba America Information Systems Inc.	38
500	The Trombone	Orchestra MultiSystems Inc.	214
408	Turbo Browser 3.1	Pacific Gold Coast Corp.	62
458	TurboTax for DOS	ChipSoft Inc.	260
458	TurboTax for Windows	ChipSoft Inc.	260
514	TVM Low Radiation 4A+	TVM Professional Monitor Corp	230
464	The Ugly Duckling	Morgan Interactive Inc.	452
446	Unisys PW Advantage Plus Model 5608	Unisys Corp.	306
515	ViewSonic 15	ViewSonic	230
416	Visual BBS	Outpost Software	68
516	Wen JK1565 Color Monitor	Wen Technology Corp.	231
414	WinBook 486	Micro Electronics	61
412	WorkMAN for Lotus Notes	Reach Software Corp.	66
447	Wyse Series 7000i Model 760MP	Wyse Technology Inc.	308
517	ZDS ZCM-1440-UT	Zenith Data Systems	214
518	ZDS ZCM-1540-UT	Zenith Data Systems	214

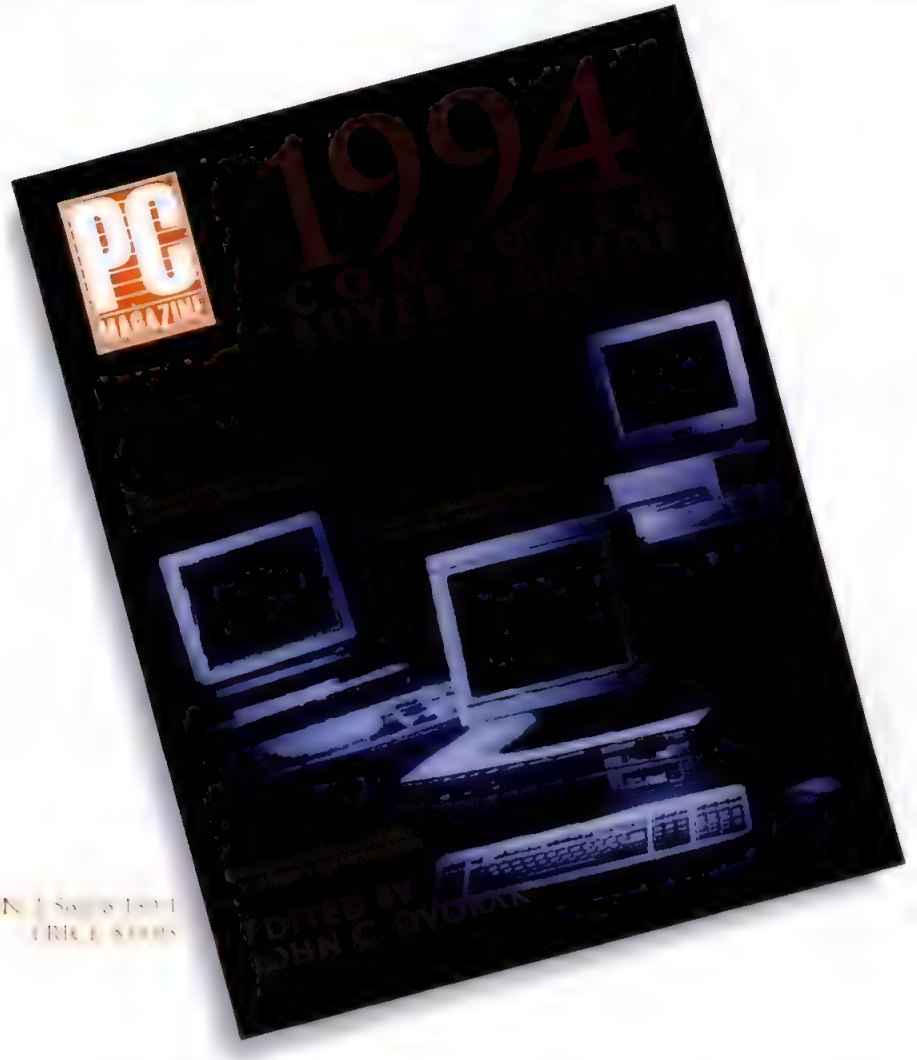
PC TECH

User-to-User ..... Browse through all the pages of a Windows program's Help. 309
User-to-User ..... A batch file that counts the number of times it's been run. 309
Tutor ..... What's on Top? Windows Z-Order Figures It Out 311
Extending Your Apps ..... Distributing Word for Windows Macros 317
Toolkits ..... Programming for OS/2 with Gpf 321
Environments ..... The Windows NT Path Functions 322
Utilities ..... ThinDisk: A Fat Trimmer for Disks 327

SOLUTIONS

Operating Environments Prevent users from changing the system time with TIME and DATE commands 333
Operating Environments A bug in Windows' File Manager concerning write-protected floppy disks. 333
Operating Environments An AUTOEXEC.BAT for use in Windows DOS boxes. 333
Word Processing ..... Getting the CD-ROM version of WinWord's Help 337
Spreadsheets ..... Calculating years and months after an anniversary date 338
Databases ..... A FoxPro function that calculates the relative Julian date 348
Graphics ..... Choosing a PC-based textile design system. 356

FOR THOSE HARD CHOICES.



Negotiating today's crowded hardware scene isn't easy. That's why *PC Magazine* and John C. Dvorak have teamed up to produce *PC Magazine 1994 Computer Buyer's Guide.* It's your one-stop source for unbiased analyses and easy-to-read comparison charts for hundreds of PCs, monitors, printers, input devices, and modems, all benchmark-tested in the world's most modern computer research facility.

Combining the latest laboratory results from *PC Magazine* with Dvorak's no-holds-barred commentary, *PC Magazine 1994 Computer Buyer's Guide* is an indispensable shopper's companion that will save you money and help you find the hardware that meets your computing needs.

AVAILABLE AT ALL FINE BOOKSTORES
OR BY CALLING 1-800-688-0448 EXT. 8171

ZIFF-DAVIS ZD PRESS

©1993 Ziff-Davis Press

After Hours

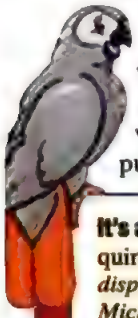
Interactive Storybooks: It's a Bird's Life, Big Anthony's Mixed-Up Magic, The Tortoise and The Hare, The Ugly Duckling, Peter Pan: A Story Painting Adventure, Slater and Charlie Go Camping; **CD-ROM Pick Hit:** 3-D Dinosaur Adventure; **Travel Guides:** Taxi; **Chess:** Kasparov's Gambit

INTERACTIVE STORYBOOKS

Reading Adventures for The Electronic Age

BY PETER SCISCO

This isn't the library Mom or Dad remembers, that's for sure. These days, little kids can snuggle up with favorite characters and meet new friends who come to life in the pages of electronic storybooks. The latest crop of interactive stories provides more control than videotape offers, letting kids choose their own paths of reading discovery. There are no pop-up book tabs to tear, no covers to fall off, no library cards to keep track of—just a new way of reading.



It's a Bird's Life. Shelley Duvall, the actress and children's-television producer, has published a computer storybook that uses music, sound, narration, and illustrations to create a charmingly warm medium out of what is generally regarded as a cool technological tool.

Of the interactive storybooks reviewed here, It's a Bird's Life is the most ambitious, both in length and subject matter. Kids follow the adventures of a group of pet birds who become homeless following a fire that destroys their owners' Los Angeles home. The birds make their way to the Amazon, only to discover that paradise is under attack by civilization. Gathering up the bird friends they have made in the jungle, they set out to rejoin their owners.

Each page is accompanied by colorful illustrations with elements that kids activate by clicking. Specific pages offer icons that play background conversations and add a further narrative element to the story.

When kids aren't listening to the story, they can play games, learn about the story's characters, or sing along with the original songs. All of these extras are designed with young children in mind and provide excellent entertainment, which translates into increased readability and unflagging interest. Children as young as three will enjoy sharing this program with Mom or Dad; their older siblings will appreciate taking flight on their own.

Big Anthony's Mixed-Up Magic. The magical world of Calabria opens up for kids in this ambitious interac-

IT'S A BIRD'S LIFE: Follow these pet birds from Los Angeles to the Amazon.

FACT FILES

It's a Bird's Life, *$39.95.* Requires: *4MB RAM, SVGA display, CD-ROM drive, Microsoft Windows 3.1 or later, MPC-compliant audio card. Sanctuary Woods Multimedia Corp., 1875 So. Grant St., #260, San Mateo, CA 94402; 415-578-6340.*
Circle 460 on reader service card

Big Anthony's Mixed-Up Magic, *$69.95.* Requires: *4MB RAM, SVGA display, CD-ROM drive, Windows 3.1 or later, MPC-compliant audio card. Putnam New Media, 11490 Commerce Park Dr., #1340, Reston, VA 22091; 703-860-3375.*
Circle 459 on reader service card

The Tortoise and The Hare, *$39.95.* Requires: *4MB RAM, SVGA display, CD-ROM drive, Windows 3.1 or later, MPC-compliant audio card. Broderbund Software Inc., 500 Redwood Blvd., P.O. Box 6121, Novato, CA 94948; 415-382-4400.*
Circle 463 on reader service card

The Ugly Duckling, *$39.95.* Requires: *4MB RAM, SVGA display, Windows 3.1 or later, MPC-compliant audio card. Morgan Interactive Inc., 41 Sutter St., P.O. Box 1158, San Francisco, CA 94104; 415-693-9596.*
Circle 464 on reader service card

Peter Pan: A Story Painting Adventure, *$49.95.* Requires: *640K RAM, Sound Blaster or Sound Blaster–compatible audio device, Electronic Arts Inc., 1450 Fashion Island Blvd., San Mateo, CA 94404-2064; 800-245-4525.*
Circle 461 on reader service card

Slater and Charlie Go Camping, *$49.95.* Requires: *2MB RAM, Sound Blaster–compatible audio device. Sierra On-Line Inc., P.O. Box 485, Coarsegold, CA 93614; 800-326-6654.*
Circle 462 on reader service card

Storybooks

tive story, complete with games and activities to stimulate thinking beyond the written word. Besides following the entertaining story about the old woman magician, Strega Nona, and her assistants, Bambolona and Big Anthony, kids become part of the tale.

Each page of Tomie dePaola's popular story, narrated by the author, includes an illustration. Unlike other electronic books, however, kids can't make anything happen by clicking on the book's pages. Instead, this electronic story allows them to explore the world in which the story is set.

IT'S MAGIC: Big Anthony informs and entertains while it tells the tale of an old magician in Calabria.

In the Explore Calabria section of the program, for example, Big Anthony's world is completely interactive. Kids move from scene to scene by clicking with the mouse, and they can launch animated sequences in the same way. These techniques are also used in the adventure part of the program, which makes things even more interesting by adding puzzles that must be solved. Using a shortcut screen, kids can move to any of the games or scenes in the program.

With a hearty blend of music, clever sound effects and—most of all—a clever story, Big Anthony's Mixed-Up Magic conjures up a spell that's hard to resist.

The Tortoise and The Hare. The charm of Broderbund's Living Books series continues with this multimedia version of Aesop's fable about a manic rabbit and a laid-back terrapin. In this updated version, the publisher uses a modern spirit to enhance the moral of the original story.

Amid all the chatter and cartoon antics, there are lessons to be learned and humorous touches to chuckle at. The hare races helter-skelter across the countryside, an accident looking for a place to happen. The tortoise approaches life with humor, grace, humility, and determination. Eventually, kids will see these characteristics win out over the hare's Type-A personality.

Simon, the narrator—a big purple bird dressed in red high-top sneakers—reads the story in English or Spanish. Kids can pause after each page to interact with objects and characters on the screen by clicking on them with the mouse, or they can select favorite pages. As Simon reads, phrases are highlighted on the screen to assist beginning readers in identifying words.

Delightful characters, clever music, and excellent animated artwork will bring out the tortoise in kids and adults alike as they dawdle happily over this electronic storybook.

The Ugly Duckling. Another traditional story meets the information age when a homely duckling is born into an impatient family of ducks. More concerned with appearance than substance, the barnyard animals shun the strange-looking chick. Only after a long search and the passing of time is his true nature revealed: The duckling is actually a beautiful swan.

SLOW AND STEADY: The Tortoise and The Hare applies a modern twist to the age-old fable.

This electronic retelling of Hans Christian Andersen's age-old fairy tale comes complete with animated characters and interactive hot spots. The narration is accompanied by highlighted phrases designed to bolster early reading skills. With elementary school children, adults can use this interactive storybook to illustrate what it means to be different, why it sometimes hurts, and what we lose when we dismiss those who don't match our requirements.

As with similar programs, kids and parents can play with each page of the story, have the story read aloud from start to finish, or move to particular pages. The publisher rewrote the original story to fit in eight pages, resulting in a simple narrative that won't hold the interest of kids over the age of

3-D Dinosaur Adventure Brings Jurassic Age to Life

CD-ROM PICK HIT

Dinosaurs have bad breath. I could almost smell the rotten vegetation when one poked its head through the computer screen and snapped at my fingers. Wearing my blue and red cellophane glasses, I was watching the introduction to 3-D Dinosaur Adventure from Knowledge Adventure.

If you're expecting lots of realistic three-dimensional video, you may feel a bit cheated. 3-D Dinosaur is excellent education/entertainment software, but the high-tech effects are limited.

Still, it's colorfully illustrated, and kids will adore the narrated description of dinosaurs and the 30 full-motion video clips. The dino-encyclopedia is a scholarly presentation, and there are also a couple of dino-games.—*Don Trivette.*

3-D Dinosaur Adventure, $79.95. Knowledge Adventure; 800-542-4240.

Circle **523** on reader service card

Storybooks

six. For their younger siblings, however, this program is a new way to meet an old friend.

Peter Pan: A Story Painting Adventure. The boy who never grew up, the evil Captain Hook, Wendy, the Lost Boys, and the Indian princess Tiger Lily all come to life in this storybook adventure. This time, there's a twist: Kids get to help Peter in his adventures by using a magic paint box full of tools.

UGLY NO MORE: "The Ugly Duckling" meets the electronic age in this lush interactive telling of the traditional tale.

As interactive artists, kids can spray magic mist, paint new solutions, pencil in clever ways out of danger, or rub out troublesome spots during the story. Each tool is cleverly animated and has a distinct personality. It isn't necessary for kids to use the tools. If they choose to do nothing, Peter will find his own way. Kids can replay scenes to see how the different Paintbox Pals work in each situation. They can also play particular scenes or save certain adventures with an electronic bookmark.

Parents will have to read the story to smaller children, since there's no spoken narrative, but young readers should be able to follow the plot without any problem. The paint box is a welcome addition that allows kids to influence the story creatively without painting themselves into a corner.

DINOS IN THE WILD: Slater and Charlie Go Camping mixes slapstick humor with a comical journey of two dinosaur pals.

Slater and Charlie Go Camping. Take a couple of lighthearted dinosaurs, mix in a little camping adventure at the end of a comical journey, add strange noises in the night, and then top it off with a generous portion of slapstick routines. The resulting dish can be served to any preschooler for many hours of interactive storytime fun.

As a story, Slater and Charlie Go Camping is weaker than what parents can expect from the library or local bookshop. The story is merely a form from which the publisher drapes loads of humorous action that kids trigger by clicking on-screen objects.

The program's animation is decidedly different from traditional storybook illustration. The softly rounded characters

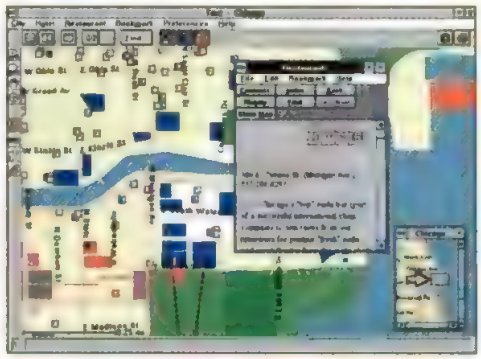
SPOTLIGHT ON TRAVEL GUIDES

Take a Taxi Without Leaving Your Office

by John R. Quain

Tired of getting confusing directions at rental-car counters? Fed up with conflicting restaurant recommendations when you're traveling on business? Then take Taxi, a reference guide to five major American cities.

Taxi is the updated and rechristened version of CityGuide, now under the aegis of News Electronic Data. This new version of the Microsoft Windows program includes five cities (Chicago, Los Angeles, New York, San Francisco, and Washington, D.C.) instead of just one in the basic package. It includes a map of the central part of each city, along with guides to the major restaurants, hotels, landmarks, and museums.



TAXI: Taxi's maps, along with its restaurant and hotel guides, help you complete travel plans.

You can search for a restaurant or hotel by setting preferences such as location, type of food, setting, and price range. Once you locate a promising eatery, you can check the updated Zagat's review for more detail and then print out a map showing the restaurant's location.

Once you've decided where you want to go, Taxi will help you figure out the best way to get there. The routing feature has been improved in this new version to make it quicker and easier to find your way around. To map your route, you select your starting and finishing points. Within a few seconds, the program will then determine the most expedient path including the mileage. You can alter routes by specifying major roads only or requesting a scenic path.

The program does not show airport locations or complete metropolitan areas; the New York City map, for example, doesn't include all five boroughs. Full metropolitan area maps are available, however, ranging in price from $14.95 to $24.95, and you can add more cities to Taxi by obtaining maps directly from News Electronic Data for $9.95 each.

Taxi, $69.95, *CD-ROM, $79.95. News Electronic Data Inc., 28 Center St., Clinton, NJ 08809; 800-439-8294.*

Storybooks

resemble Claymation figures, each with a decidedly childlike appearance and manners that hark back to the Keystone Cops and Three Stooges. Miniature fire trucks douse campfires, giant monsters disguise themselves as rocks, and a hornet's nest gets mistaken for a football, with predictably disastrous results.

Young children will get plenty of chuckles out of launching the different comic bits, but the interest level will soon flag for all but the youngest players.

These electronic storybooks take a different approach to storytelling but share a strong graphical appeal and a level of innovation that help bring the written word to life for the youngest crop of readers and computer users.

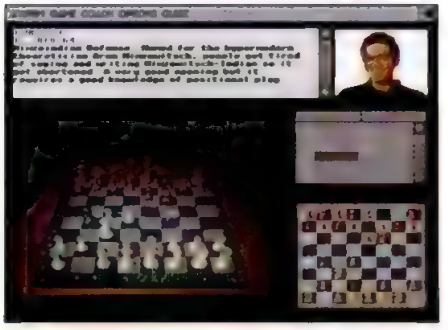
CHESS

Kasparov's Gambit

BY ERIC BERLIN

Each new chess-playing computer game tends to raise the stakes just a little bit more, adding helpful hints for the novice or a wider variety of opponents for the advancing player. Kasparov's Gambit, from Electronic Arts, offers these features, but it also gives you Garry Kasparov himself.

When you're in a tight spot, Kasparov can be summoned for advice, but he may also pop up unbidden to offer support and guidance, ranging from "That's just what I would have played!" to "I'm not sure that's right." Kasparov's written commentaries also pop up in the 500 games that are available for analysis, as well as throughout the 120 tutorial files covering openings, endgames, and everything in between. With such an extensive and informative database at hand, it's tough to imagine a better chess program for players even casually interested in improving their games.



CHECKMATE: Kasparov's Gambit gives you strategy and tips from a master.

When you've finished your studies and feel ready to take on the grand master himself, keep in mind that Gambit won the 1993 International Computer Chess Championship. After one or two stinging attacks in Serious Mode (where no advice or undo modes are available), it's nice to go back to the safety of having Kasparov on your side and not against you.

Kasparov's Gambit, *$59.95. Requires: 386SX/16-based PC or better, 640K RAM, VGA display. Electronic Arts Inc., 1450 Fashion Island Blvd., San Mateo, CA 94404; 800-245-4525.*

Circle 519 on reader service card

ONE YEAR
22 issues for $29.97.
YOU SAVE 54%!

TWO YEARS
44 issues for $49.97.
YOU SAVE 62%!

Call toll-free today:
1-800-289-0429

INSIDER'S PRICE
FOR OUR READERS —
SUBSCRIBE & SAVE

Plus a Bonus!
3 Disks with 146 utilities FREE with your paid order.

ANNUAL COVER PRICE	REGULAR SUBSCRIPTION PRICE	YOUR PROFESSIONAL RATE	BONUS STATUS
~~$64.90~~	~~$44.97~~	$29.97	3 FREE DISKS

Subscribe now, and get 22 issues for only $29.97 — that's 54% off the annual cover price! Better yet, sign up for two years and get 44 issues for just $49.97 — a savings of 62%!

Along with your order you'll also get PC Magazine's **"Utilities Library"** on 3 disks — **FREE** with your paid subscription! These 146 DOS and Windows™ utilities, selected especially for new subscribers by PC Magazine's editors, let you upgrade your system, boost your PC power, and simplify tasks — all at the touch of a key! This exclusive software is available only to new subscribers!

Canada and foreign add $36.00 per year. U.S. funds only. Canadian GST included. Please allow 30 days for shipment of first issue. FREE disks will be sent upon payment.

COMING MAY 2-6, LAS VEGAS. PRE-REGISTER FREE! SAVE $50!

IF YOU ONLY ATTEND ONE NETWORKING EVENT THIS YEAR, THIS IS THE ONE

NETWORLD+INTEROP 94

Announcing the most important networking and computing event ever held.

Networking changes minute-to-minute. LAN, WAN and telecommunications are converging into a single all-encompassing business environment—connecting not only desktop to desktop, but company to company.

NetWorld®+Interop® 94, The Networking Summit, was created specifically to mirror these changes.

This unique forum puts together the two biggest names in networking events. NetWorld,® the hallmark of the desktop LAN community. And Interop,® the proving ground of interoperability for the WAN and telecom worlds.

What you get is the first truly all-in-one networking forum.

The Summit for Networking Professionals.

NetWorld+Interop 94 is the gathering place for the industry's best and brightest. Only NetWorld+Interop 94 offers you this comprehensive educational experience free:

- *The InteropNet,*™ featuring a guided tour of industry's only live multi-vendor, multi-protocol network that mirrors the interoperability challenges you face today.
- *Internet Showcase,*™ where you can learn about the richness and diversity of the Internet.
- *Start-Up City,*™ an exhibit area dedicated to showcasing innovative new products and solutions from emerging companies.
- *Configuration Clinic,*™ where you can get suggestions for designing and configuring your network from the best in the business.
- *CNEPA Labs,* a forum for the transfer of technical information from the vendors to the network computing professional.
- *TSANet,* where Technical Service Alliance members join together to solve your biggest networking challenges right on-the-floor.
- *Solutions Showcase*™ *Demonstrations,* cooperative technology demonstrations by leading vendors including ATM, APPN, Fast Ethernet and Multimedia.

You will see the hottest new technologies demonstrated by more than 600 of the world's leading networking companies. You'll leave the show ready to make the best possible buying decisions for your company. Because when you see it at NetWorld+Interop, you know it works!

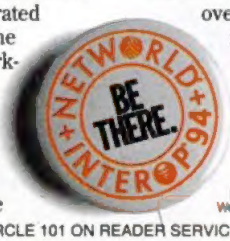
Don't wait. Pre-register now and attend FREE!

NetWorld+Interop 94 Las Vegas takes place May 2-6, 1994 (exhibits open May 4-6) at the Las Vegas Convention Center.

For more information and details on how to attend FREE (a $50 savings), or to become an exhibitor, call 1-800-488-2883 Extension 316.

Outside the U.S., call 415-578-6900, or contact us over the Internet at networld@interop.com.*

Don't miss this unparalleled chance to experience the best in networking.



*More information is available through Interop's Gopher Server at programs.interop.com and World Wide Web (URL http://programs.interop.com).

CIRCLE 101 ON READER SERVICE CARD

NetWorld+Interop 94 is produced by Interop Company. Interop is a registered trademark and Configuration Clinic, Internet Showcase, InteropNet and Solutions Showcase are trademarks of Interop Company; NetWorld is a registered trademark of Novell, Inc. ©1994 Interop Company, 303 Vintage Park, Foster City, CA 94404. 415-578-6900. Fax: 415-525-0221.

Abort, Retry, Fail?

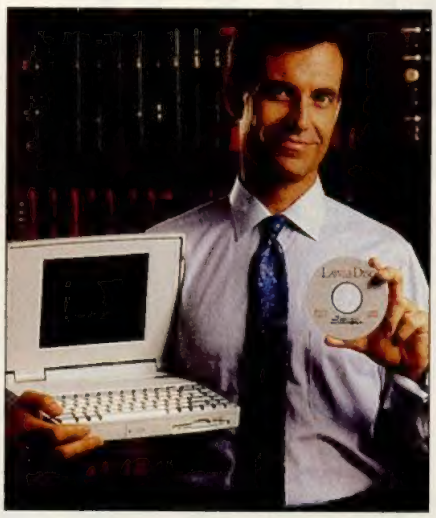
THE LIGHTER SIDE OF PERSONAL COMPUTING

By Don Willmott

We'll refrain from a cheap lawyer joke, even though it's pretty obvious this guy isn't going to get much done with that Law on Disc CD-ROM and that notebook. (Michie Co. ad.)

Press Releases We Never Finished Reading

"Robert De Niro, Julia Roberts, and Tom Cruise will NOT be demonstrating software at the ABS booth during the Comdex/Fall '93 show."—AMERICAN BUSINESS SYSTEMS PRESS RELEASE



Hey, Culligan Man!!!

"Computer company needs experienced computer tech for Central Indiana area. PC Compatibles. Proficient in major DOS, Windows, and softwater applications."
—*THE JOURNAL AND COURIER* (LAFAYETTE, INDIANA)

Found inside an Everex modem box.

EVEREX SYSTEMS INC.
EVER for Excellence

INSP. 2

This product has been inspected by

INSPECTOR GADGET

Practice What You Preach!

When Delrina Corp. advertised job openings in the *Toronto Globe and Mail*, it invited applicants to fax or mail in their résumés. One problem: Delrina, maker of the market-leading fax software WinFax PRO, neglected to provide a fax number.

That's No Way to Talk About an Icon

"Icons are the droppings located at the top and sides of the Windows display."
—*MANUFACTURING SYSTEMS*

Help Wanted

"Varied work for smart man or woman. Knowledge of Italian, Macintosh and/or snowboarding a plus."
—*THE LITCHFIELD COUNTY TIMES*

Philistines on Parade

"Classical Paintings: DaVinci, Degauss, Rembrant, Van Gogh and more! View the works of history's finest artists."
—*TIGER SOFTWARE CATALOG*

Call 800-914-EARS to get Blue Sky Technologies' $32.95 Ear-Mic, a microphone that you can use with audio equipment and sound boards. By the way, you can decorate it with an earring.

Richard Tennant

If your entry is used, we'll send you $50 and a *PC Magazine* T-shirt. Send your entries to Abort, Retry, Fail?, *PC Magazine*, One Park Ave., New York, NY 10016-5802. Winners this issue: Hugh Cox, Noah Duguid, Alan Mehringer, Wayne Miller, Edward Morgan, Tom Phipps, and David Silver.

THE THRILL OF VICTORY AND THE AGONY OF DEFEAT.

When you offer 16MB of RAM, a 450MB hard drive, a 256KB cache, a #9VL board, Sound Blaster 16 card, CD ROM disk drive, Peavey Speakers and a VS17 Color monitor for $3,749, people are sure to take note. Particularly those who make a living comparing computers. Which is exactly what *PC Computing* did when they ran our system through a battery of tests. They named the Dell Dimension XPS 466V "Best Multimedia System."

BYTE Magazine put it a little differently. They recently named the Dell Dimension XPS 466V (in a slightly different configuration) "Best system for Windows." And at the same time it earned *PC World's* "Best Buy".

What's more, J.D. Power and Associates ranked Dell highest in the 1993 Desktop PC Satisfaction Study among business users.†

Proof, that of all the systems out there, there's really one clear winner.

DELL™

TO ORDER, CALL
800-225-4907

HOURS: MON-FRI 7AM-9PM CT SAT 10AM-6PM CT SUN 12PM-5PM CT
IN CANADA* CALL 800-668-3021. KEYCODE #118KS

Order Code #5000525

intel inside

†1993 J.D. Power and Associates Desktop Personal Computer Satisfaction Study conducted among 1,956 user respondents.

PC MAGAZINE LIBRARY

KICKBUTT

60 MHz Pentium microprocessor. Wow.

8MB RAM

450MB hard drive

256KB external cache

PCI #9GXE video accelerator card with video control panel software

1MB video RAM

MS-DOS® 6.2, and a mouse

Microsoft® Windows™ for Workgroups 3.11 (or Windows3.1)*

VS14 Color Monitor (14," 1024 x 768, .28mm, NI)

Multi-session, double-spin CD ROM drive

One 3.5" diskette drive

This system comes from the company that ranked highest in the 1993 J.D. Power Desktop Personal Computer Customer Satisfaction Study among business users†

$2,999

Business Lease◊: $111/ month

Multimedia Sound upgrade including Sound Blaster 16 and Peavey® Speakers available for an additional $199.

DELL DIMENSION™ XPS P60 PENTIUM™ SYSTEM

You might think you've been clippin' right along with your i486.™ Well, sit down in front of one of these babies and find out what speed is all about.

Take a minute to read the features up there by the monitor – starting with that sweet little 60 MHz Pentium chip that's nearly twice as fast as any i486 chip. Then call the 800 number below and find out how simple it is to finance a new Dell® Pentium System. You won't find anything in the same league. Not with all that power. And not for $2,999. Yeah, $2,999. That's the kicker.

DELL™

TO ORDER, CALL

800-873-1290

HOURS: MON-FRI 7AM-9PM CT SAT 10AM-6PM CT SUN 12PM-5PM CT

IN CANADA*, CALL 800-668-3021. KEYCODE **#11BKR**

Order Code **#5000452**

†1993 J.D. Power and Associates Desktop Personal Computer Satisfaction Study conducted among 1,956 user respondents.